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BULLETIN

OF

THE JOHNS HOPKINS HOSPITAL

Entered as Second-Class Matter at the Baltimore, Maryland, Postoffice.

Vol. XVII.—No. 184.] BALTIMORE, JULY, 1906. [Price, 25 Cents

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BARON LARREY: A SKETCH.[1]

By J. Chalmers Da Costa, M. D.[2]

Among the many remarkable men that stood with the greatest captain of modern times in his Titanic combats was one whose career attracts the particular interest of surgeons. He was a military surgeon for over half a century, and he participated in twenty-six campaigns, from Syria to Portugal, and from Moscow to Madrid. He followed Napoleon with love that never failed, with constancy that never faltered; and gave all his best skill to friend and foe alike, as duty called. He was brave on the battlefield and in the plague-hospital, but he was braver in the Tuilleries and in the imperial tent; for he always dared to tell his master the truth. That master loved and trusted him; ennobled him; decorated him before the army; when at St. Helena, referred to him in his will as "the most virtuous man I have ever known;" and bequeathed to him ten thousand francs as a souvenir of enduring affection.

It is needless to say that I refer to the greatest military surgeon that ever lived,[3] to Dominique Jean Larrey, Baron of the Empire, Commander of the Legion of Honor, Inspector General of the Medical Staff of the French Armies, Chief Surgeon of the Grand Army and First Surgeon of the Imperial Guard. He was born in 1766, in the romantic region of the High Pyrenees. His birthplace was the little village of Beaudeau, which is distant about a mile from Bigore, a well-known watering-place, celebrated since Roman days for the medicinal virtues of its mineral springs.

At the period of Larrey's birth, centuries of misrule were

[1] Read at a meeting of the Johns Hopkins Historical Club, February 12, 1906.

[2] The chief sources of information for this article are the Surgical Memoirs of Baron Larrey. (The first two volumes have been translated by Richard Willmott Hall; the third volume, by John C. Mercer); Sloane's Life of Napoleon, Taine's Ancient Règime, Levy's Private Life of Napoleon. The Memoirs of Baron Marbot, The Memoirs of Marshal MacDonald, The Hospitals and Surgeons of Paris, by F. C. Stewart, and A Memoir of J. Mason Warren, M. D., edited by Howard Payson Arnold. The Life of Larrey, by Paul Triaire, I was not familiar with when writing this sketch and I did not see it until Dr. Harvey Cushing showed it to me in Baltimore. Had I been able to use this excellent and complete work errors would have been corrected which doubtless exist in this article, and the subject would have been treated more accurately.

[3] Mitchell Banks calls him so and I think justly. See "The Surgeon of Old in War."—*Medical News*, September 4, 1897.

about to culminate in a mighty catastrophe. All faith and loyalty had gone out of life; there were no real leaders; the nobles devoted their time to debauchery, intrigue and the chase; love was dead, and gallantry reigned instead. The ambitions of the Bull's Eye were directed purely to getting influence, so that this influence might bring power and gold. Everything went by favor, and nothing by merit; and harlots wheedled from the king every appointment, from Archbishop to Gamekeeper. The nobles thronged Versailles, leaving their estates in utter neglect and ruin, and permitting their peasants to starve and rot. The people, in the words of Macaulay, were beasts of burden and were soon to become beasts of prey. They were ignorant beyond conception, were brutal as pigs or oxen, and were regarded by the authorities as mere material for the tax-gatherers. Famine stalked through every district; and lust, anger, ferocity, and brutal hatred brooded in every workshop and hovel. The best that could happen to a son of the people was to become the steward of an estate and oppress his brothers; the best that could happen to a daughter of the people was to become the bed-room slave of a well-to-do captor. The people could truly say, as the Corn Law Rhymer was to say many years later:

"Our sons are the serfs of the rich by day,
"And our daughters their slaves by night."

It was thirteen years before Larrey's birth that Lord Chesterfield, traveling in France, wrote: "All the symptoms which I have ever met with in history previous to great changes and revolutions in government exist and daily increase in France"; but the rulers were blind and could not see. In 1766, the old Satyr, Louis XV, in spite of the dreadful poverty of the people, still kept four thousand horses in his stables, and still spent every year sixty-eight million francs for his household expenses, the equivalent of at least twice that sum to-day. Pompadour, who had cost him directly thirty-six million francs, and indirectly had cost him wars, famines, pestilences, and his immortal soul, had been dead but two years; and the beautiful and brazen DuBarry reigned in her stead. The easy view among the rich and powerful was that what had been would continue to be; but even Louis was a little wiser and said: "After me, the Deluge,"—and after him the Deluge came. As has been said: "At this time there were trees growing in the forest out of which the frame of the guillotine was to be made." The educated world had become skeptical, philosophical, utterly cynical, and prated and canted continually of philanthropy and the rights of man. A young fellow named Charles Henri Sanson was taking from his father the lessons that were to fit him to be the great M. de Paris, the public executioner of the time of the Terror. Voltaire was living at Ferney in Switzerland, was attacking with searing sarcasm and almost Satanic mockery the most cherished traditions of the court and of the church, and was placing in a pillory before all the world every hideous instance of public wrong and injustice. Diderot, with some great contemporaries,—notable among whom were Grim, D'Holbach, and d'Alembert—was editing the Encyclopédie, and was helping to lay broad and deep the foundations of modern thought. Rousseau was in England, just preparing to return to France, where he was to hide in a garret, and in that garret brood out the dread retribution of the French Revolution. Marat, the future editor of the Ami de Peuple, the future advocate of a sacrifice of two hundred and seventy thousand lives, the future victim of Charlotte Corday, was a poor, unknown doctor, and was leading a wandering existence. Robespierre, the future creator of the Terror, the sentimentalist who dearly loved dogs, the man who was to move the abolition of capital punishment, and was to resign a judgeship rather than impose a death-sentence, the man who came to make slaughter a creed and to kill friend and foe alike, was a school-boy at Arras, living with his father, the advocate. Danton, the lion-hearted Danton of later days, the one that was to defy the threats of united Europe and was to "cast down as a gage of battle the head of a king," was but seven years old and was living at Arcis-sur-Aube. Napoleon Bonaparte, whose loving follower Larrey was destined to become, had not yet been born. This illustrious man was born on the fifteenth of August, 1769. It must have been evident to all thoughtful minds in 1766 that the world was on the threshold of great events, that the future was pregnant with portentous happenings, and that Jean Jaques spoke the truth when he said: "This is an age of revolutions."

Larrey, like most great men, was born poor. His parents were too poverty-stricken to pay for his education; and what instruction he got was obtained gratuitously from the Abbé de Grasset, a good and kindly churchman, who had originally become interested in the boy because he possessed a good voice and sang in the choir. When Larrey was thirteen years of age, his father died; and the son went to Toulouse to live with his uncle, Alexis Larrey, a successful surgeon of that city, and the chief surgeon to a large hospital. The city of Toulouse had recently rung in the ears of men; for it was there, in 1762, that probably the most infamous verdict ever given by a judicial tribunal had been rendered by the Parliament of Toulouse against the Calas family. This verdict excited Voltaire to frantic rage, and is dealt with in his book "Sur la Tolerance."

While in Toulouse and under the guidance of his uncle, Larrey finished his education in the College of Esquile, and then studied medicine and surgery. He left Toulouse in 1787, when he was twenty-one years of age, and went direct to Paris. This was two years before the convocation of the States General. Soon after reaching Paris, he took a public examination and obtained an appointment as auxiliary surgeon in the navy. He went to the great naval station at Brest, underwent another examination, was appointed chief surgeon of a war-vessel, and was assigned to the Vigilante.

As the boat was not to sail for some months, Larrey passed the time in lecturing to students on surgery and anatomy, an instance of that fiery activity that possessed him all his life. He was also interested in visiting the prison of the galley-slaves. Ten years later, the notorious Vidocq, who afterwards

became chief of the French police, was a convict in this same dreadful Bagne of Brest, from which he made a remarkable escape. We learn of its terrors in his Autobiography, and the conditions were probably much the same at the time of Larrey's visit. In the Bagne, Larrey saw a man seventy years of age, who was totally blind during the daytime, but could see at night. This condition of day-blindness had resulted from a confinement of over thirty years in a dark, underground cell. Larrey believed that the blindness was the result of the long exclusion of light, which, of course, is one of the known causes of this interesting condition. In a postmortem examination made upon a galley-slave at this time, Larrey found transposition of the viscera.

Larrey

The newly-appointed naval surgeon sailed from Brest for Newfoundland in April, 1788, and was gone six months on his trip. He made many interesting observations, which are recorded in his Memoirs. For instance, he discusses sea-sickness, a condition from which he suffered himself, and which he justly calls "the most painful disease with which a mariner can be affected." He studied its development and theorized on its cause, and came to the conclusion that it results from oscillation of the brain, saying that when the brain is large and soft it is more liable to be affected. Hence, young persons, whose brains are voluminous, are most usually the subjects of sea-sickness; while persons of advanced ages, with firm brains, are less liable to the disease. He says graphically that the first effects are "sadness and panic, which seizes the individual. The face becomes pale, the eyes are suffused with tears, and the appetite for food is entirely removed. The patient is silenced; seeks solitude and repose; reels like one intoxicated; is affected with vertigo, tinnitus aurium, and unpleasant weight of the head. Nausea succeeds and, soon after vomiting, which becomes frequent and painful, and continues almost without intermission until the cause ceases." It, therefore, becomes evident to us not only that Larrey was sea-sick, but that he was most extremely sea-sick.

He also discusses frost-gangrene; the catching, cleaning and salting of cod-fish; and the tastes and habits of the Newfoundland caribou, which in some respects were extraordinary; as one of them broke into fold, and as the result of this forcible entry, a cow became pregnant. Larrey always wondered what the product of this ill-assorted love affair could have been.

He was very much interested in the change of plumage of the birds in Arctic climates, and noted that the black-birds are red-brown in the summer and white in the winter. He also presents a dissertation on the habits of the Esquimaux. It had always been my impression that the Esquimaux, almost alone among races, use no intoxicants; but Larrey found the Newfoundland Esquimaux using a fermented liquor made of the buds of the fir-tree. He speaks, likewise, of the insect-pests in Newfoundland during the summer; says particularly that "a species of gnat called the mosquito is very troublesome, and produces by its sting local inflammation and fever, which are but ephemeral. The effects of these stings were removed by washing with salt-water and by rest and refreshment. By my advice, our men protected their skin from them by anointing themselves with camphorated oil and by wearing a piece of gauze over the face." The phenomenon of phosphorescence also interested him greatly. This he believed to be the result of the presence of numerous animalcules "and putrid animal-matter. The situations where these lights appear most brilliantly is consequently unwholesome, if persons continue in it."

Larrey reached Brest on his return voyage in October, 1788; and early in the winter of 1789, he went to Paris. The winter of 1789 he justly calls "the memorable winter," and says that between the time of his return to Paris and of his departure for the campaign of the Rhine "many remarkable events transpired in this capital to which I was a witness"; but, unfortunately, he does not tell the events, but confines himself to speaking purely of surgical matters. He departed for the Army of the Rhine in April, 1792, just thirteen months before the beginning of the Terror, and the very month in

which the guillotine was adopted as the official instrument of execution. It had been invented by Dr. Guillotin and had been improved by Sanson, the executioner. A musician that boarded with Sanson suggested the obliquely set knife; and, irony of fate, Louis XVI suggested the neat little basket to catch the separated head.[1]

It was in the winter of 1789 that the people awoke to their wrongs and their power, and that the earthquake-tread of red Democracy began to echo through the land. Tumult and disorder became common in the capital. We read in history of the attack of the mob of the St. Antoine Quarter upon the paper-warehouse of Réveillon, who was falsely charged with saying: "A workman can live well on fifteen sous a day." In this attack on the paper-warehouse, five hundred were killed and very many were wounded; and Réveillon himself took refuge in the Bastille. Larrey saw many of those wounded in this affair. They were brought to the Hotel Dieu in the service of the celebrated Desault.

Desault demonstrated these cases, and used them to emphasize his views upon the treatment of gun-shot wounds. He strongly opposed the popular alcohol-dressing, and used lead-water, as recommended by Paré. He opposed the attempt to alter the nature of the wound by excision and suture, except in wounds of the face and mouth, when he advocated it. He opposed immediate amputation, a view from which Larrey subsequently positively dissented.

Desault must have had many harrowing experiences during the Revolution. He was physician to several of the chief jails; he did not attend the Dauphin—Peleton having been the surgeon that had him in charge; but he saw most of the prisoners that went to execution from the Conciergerie. Desault must have freely moved among the prisoners, jailers, and revolutionists, just as did Dr. Manette in Dickens's Tale of Two Cities; and he seems to have been almost universally loved and respected. He was a man of violent temper, as we learn from the following account of him, given by Sir Astley Cooper (A Book about Doctors, by J. Cordy Jeaffreson, Vol. I, p. 8):

It was in the winter of 1792 that Sir Astley Cooper was a student under Desault and Chopart. A boy, sixteen years of age, was brought to Desault's clinic. He was said to have paralysis of the right arm; but the surgeon suspected that he was malingering. Desault spoke to the boy by name and calmly said: "Take off your hat." The boy thoughtlessly took the supposedly paralyzed hand and removed the hat. "Hand me a stick," called Desault; and then, he attacked the boy before everybody and soundly beat him. This remedy he called "club cordial."

Once during the Revolution Desault was arrested, and was confined in the Luxembourg Prison for three days. This was in many respects the least terrible of all the Revolutionary jails. It was considered the aristocratic prison. It was a palace that had been made into a prison, and the first noble suspects in the beginning of the Revolution were sent there. Later, however, the ordinary, every-day citizen occasionally found his way there; and finally, on a certain notable night, Danton, Camille Desmoulins, and their friends were brought in, at the order of their one-time friend, Robespierre. Desault was quickly liberated; returned to his work as a teacher of surgery in the Hotel Dieu; and was not arrested again.

At the height of his fame, six hundred pupils attended his clinics. The horrors of the Revolution depressed him greatly and embittered his final years. At his death, he was attended by two friends, both of them celebrated, and both remembered to-day; Bichat, the founder of histology, and Corvisart, subsequently the physician to Napoleon and a great authority on the heart. At the present day, we remember Desault particularly by his circular amputation of three incisions, a cone being thus made, the apex of which is the divided bone; by his long extension-splint for fracture of the thigh; and by his operation for one form of salivary fistula. Chopart, Desault's hospital colleague, is still remembered in this age for his amputation through the middle tarsal joint, this articulation being yet called in anatomy the line of Chopart. The writings of neither of these men endure, but we may say with Longfellow:

> "Happy those whose written pages
> Perish with their lives,
> If among the crumbling ages
> Still their name survives."

Some writers have stated that none of the crowd was killed at the taking of the Bastille; but there must have been some of them injured, for Larrey says that he saw the wounded of the tumult of that day. The day that martial law was declared in the Champs de Mars, many wounded persons were brought into the Invalides; and our surgeon saw them being treated by Sabatier, whom we remember to-day as the surgeon that advocated suturing a divided intestine over a cylinder made of a playing-card smeared with turpentine. This method of Sabatier was a modification of the method of Four Masters of the Thirteenth Century, who used the trachea of an animal; of the method of William of Salicet, who employed the dried and hardened bowel of an animal; and of the method of Watson, who used a cylinder of isinglass.

On May 13, 1789, Larrey seems to have seen a genuine case of anthrax. He tells us in his Memoirs that an ox having a carbuncle was purchased at a market by a butcher; and that the butcher killed the animal in haste, because he was afraid that the carbuncle would be fatal and that he would lose the sale of the meat. One of the boys that had killed the ox developed a black pustule of the face and stiffness of the left jaw. This tumor grew purple-red around its margins, and was black and depressed in the center; and the patient died within a few days, by which time the lesion had spread over half the face. Another boy in the family had the same fate, the tumor having arisen on the neck. The wife of the butcher also developed a similar condition; and when Larrey saw her, she seemed on the point of death. He ordered what he called "cordial antiseptic drinks," aromatic cataplasms, and min-

[1] Memoirs of the Sansons.

eral lemonade; and had vinegar evaporated in the chamber. He then held a consultation with M. Boyer, a celebrated surgeon of La Charité. Boyer is remembered as the author of a noted book which was supposed to embody all the surgical knowledge of his time, in which he makes the statement that any further progress in the art or science of medicine is impossible. The surgeons agreed that the pustules should be extirpated, and the raw surfaces cauterized. The patient so treated recovered.

During the winter that Larrey stayed in Paris, he passed a competitive examination for the position of interne of the Hôtel Dieu; but the appointment was given to someone else having more influence. He also passed an examination for Second Surgeon of the Invalides, and this place was given him. A short time afterwards, war was declared; and Larrey was sent as a surgeon of the first class to the Army of the Rhine, then commanded by Marshal Luckner, but soon afterwards put under the charge of Lieutenant-General Kellermann. Marshal Luckner, a fine old soldier, came to the guillotine during the Terror. Lieutenant-General Kellermann soon afterward won the great conflict of Valmy; and when Napoleon became Emperor, Kellermann was created a Marshal of France and Duke of Valmy. He was soon displaced from the command of the Army of the Rhine by General Biron, who was quickly succeeded by General Custine. The latter occupied Frankfort, and was then obliged to retire to the Rhine. In the fall of this year, Dumouriez won the great battle of Jennappes, and thus secured possession of a large portion of the Austrian Netherlands.

It was in the Campaign of the Rhine that Larrey first became impressed with the "inconvenience to which we were subjected in moving the ambulances and military hospitals. The military regulations required that they should always be one league distant from the army. The wounded were left on the field until after the engagement, and were then collected at a convenient spot, to which the ambulances repaired as speedily as possible; but the number of wagons interposed between them and the army, and many other difficulties, so retarded their progress that they never arrived in less than twenty-four or thirty-six hours; so that most of the wounded died for want of assistance." Larrey saw that it was absolutely necessary to construct vehicles that would readily convey the wounded actually during the battle. He was unable to perfect the plan at this period, but did so soon afterwards; and the principle of actively treating men on the battlefield and quickly transferring them to a field-hospital seems to have originated in the mind of this distinguished surgeon.

When he was at Mentz, or Mayence, a town in Hesse that the army occupied for some time, he attended the anatomical demonstration of the celebrated Dr. Sömmering, whose method of numbering the cranial nerves is the one that we follow today; and he also repeated with Dr. Straak some of the very earliest experiments in galvanism. He was able to carry out on a recently-amputated leg some experiments that had previously been made only upon animals. The contraction of the muscles that followed the galvanization of the popliteal nerve led Larrey to believe that galvanism might restore paralyzed limbs; but he says that the very slight benefit that had since been derived from galvanism and electricity in the cure of such conditions led him to give up this idea.

It was at this period of his career that he invented the needle that was long known by his name. These needles were made of fine and highly-tempered steel and were of different sizes. The needle was curved into a semi-circle, the extremities being parallel. The point was a small curve with sharp edges, and the edges terminated toward the body in obtuse angles. The edges were rounded and slightly thinner than the middle of the needle.. There was a square, transverse opening through the eye, and a groove; so that a cord or ribbon could lie in it. The advantages that he claimed for these needles were the readiness with which they would pass through the skin and the fact that the ligature would lie free and keep its flattened form, thus supporting the wound-edges.

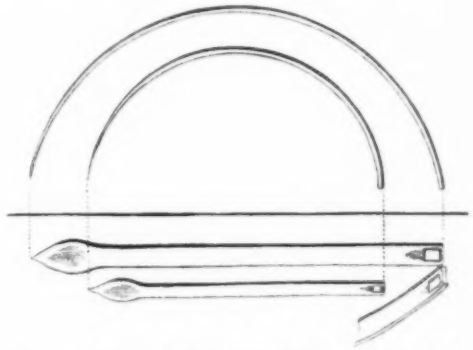

FIG. 1.—LARREY'S NEEDLES (LARREY'S MEMOIRS).

Larrey was in several actions during this campaign, and became very seriously impressed with the difficulties of handling the wounded; through the fact that at Limbourg the French were obliged to leave them on the field, and they fell into the hands of the enemy. He applied for permission to construct a flying ambulance. He at first thought of having the wounded carried on horses in panniers, but he soon gave this idea up; and he was led to devise a carriage that united "swiftness to solidity and ease." He began to use his ambulance in this campaign with great success.

He was in some very serious battles, in which he made some extremely interesting observations on gun-shot wounds. His experience led him to advocate immediate amputation in certain grave injuries of the extremities—a view that he never abandoned. He became convinced that people were sometimes killed by what was known as "windage" of bullets; there being no external wound, but a postmortem examination showing grave internal injury. Surgeons then believed that such injuries were caused by the wind from a cannon-ball or a shell-fragment that had passed close to the body, but had not struck it. Larrey thought there must have been a blow by the projectile, in spite of the absence of surface-contusions. Military sur-

geons have entirely abandoned the idea that injury by the wind of a ball is possible, and attribute the so-called wind-contusion to a projectile that has lightly passed across the surface and in doing so has left no surface bruise.

The health of the soldiers in this campaign was excellent, although thousands of them were new recruits that had been hurriedly gathered; but they received good food and had plenty of exercise. It was in this campaign that Larrey first met General de Beauharnais, a native of Martinique, of whom he became extremely fond. The general addressed to the Convention a letter highly commending the surgeon for his services and speaking in flattering terms of the ambulances that he had recently invented. This unfortunate gentleman likewise fell a victim to the guillotine, and left a widow to become Empress of the French.

After the Army of the Rhine had lost several combats, General Pichegru took command. In a few days the army joined the Army of the Moselle; and the chief command was given to that brilliant young man, General Hoche. We remember Pichegru as the able but unfortunate soldier who conquered Belgium and the Netherlands; suppressed the Parisian insurrection in April, 1795; became, later, involved in the conspiracy of Georges Cadoudal; and, after being captured by the police of Fouché in 1804, committed suicide. Hoche was one of the most promising and brilliant soldiers of the Revolution. He suppressed the Vendean revolt in 1795-96; and, when only twenty-nine years of age, died at Wetzler. Had he lived, he would unquestionably have been one of the greatest of Napoleon's marshals.

During the campaign, Larrey amputated a foot between the tarsal and the metatarsal bones, doing what we now call the amputation of Lisfranc. He also extirpated the head of the humerus, saving the arm—an operation of which he afterward became a warm advocate. When the troops went into cantonments, an adynamic fever, which was probably typhoid, broke out. Larrey was then sent for to go to Paris and complete the organization of an ambulance-service, and to establish it in the different armies of the Republic; as the value of these ambulances had been most conspicuously demonstrated in the campaign of the Rhine.

In 1794, Larrey was appointed Chief Surgeon to the army that was intended for Corsica, and was ordered to report at Toulon. This city had been captured from the English the previous year. At the siege, a certain Napoleon Bonaparte had been a captain of artillery; and in the same company of which he had been captain, Marmont and Suchet had been junior officers, and Junot had been a sergeant. In the army destined for Corsica, Bonaparte was a general of brigade.

During the few days that Larrey remained in Paris, he married a lady to whom he had long been engaged, a daughter of M. Leroux, who had been for a time Finance Minister under Louis XVI. On reaching Toulon, Larrey met General Bonaparte for the first time. Bonaparte was then twenty-five years of age, and commanded the artillery. He was beginning to be known, and the command of Paris had been offered him by Robespierre; but he had had the good sense to decline to take Henriot's position. The uncertainty of official life, however, was well manifested; for about this time he was put in prison for thirteen days as a suspect, and not long afterward he lost his commission altogether.

The squadron was to repair to Nice and take on soldiers; and Larrey went there by land, traveling with the Inspector of Hospitals, M. Heurteloup, a man remembered by us as the inventor of the artificial leech.

The presence of the English fleet prevented the French expedition from reaching Corsica, so Larrey spent some time with the Army of the Maritime Alps. At this time, he formulated his views on the treatment of the apparently drowned, advocating a form of artificial respiration that consisted in blowing into the mouth of the person to distend his lungs, and pressing on his chest to empty them.

He then went to Spain as Chief Surgeon of the Army of the Pyrenees, and was present at the taking of Figuières and the sack of Roses. He speaks in his journal of individuals of whom he had amputated more than one extremity, and says that they had afterwards become very fat; and, because their circle of nutrition was so much lessened in extent, their alvine evacuations became much more frequent.

At this time, he became very much interested in the treatment of burns, and insisted that a person that has been burned requires a generous diet; although this view is entirely contrary to the opinion of Hippocrates, who restricted them to a low diet. This solemn quotation of Hippocrates suggests that the latter must still have been regarded as an authority. In fact, in the age of which we speak, surgery was in a chrysalis-state and was barely emerging from its cocoon; and the first few hesitating words of truth had, as yet, but scarce been lisped by the baby lips of science. Another of Larrey's views regarding burns was that opium should not be given in their treatment.

He notes that the Spanish love of beauty and good taste appeared even in the preparation of their linen for dressings, which was like cambric; and of their lint, which was as fine as silk, and was tied up in small packages, tastefully arranged in different colors by the Queen of Spain and the ladies of the court.

In 1796, Larrey's health broke down, and he obtained permission to go to Paris. The city was at times somewhat turbulent, but there were no actual outbreaks; for young General Bonaparte had discouraged anarchy by filling several commodious grave-yards with the bodies of enterprising revolutionists. Larrey soon went to Toulon, where he learned that the Corsican expedition had been postponed without date; so he stayed a while at Toulon, and began to teach military and naval surgeons, giving courses in anatomy and theoretical and clinical surgery. He pursued this custom wherever he went. We find that whenever the army remained for a few weeks or months in one place, this indefatigable man organized a school and caused all the surgeons of the army to attend it. In this school they would perform operations on the cadaver, study

anatomy, and question one another about important topics of military surgery. It seems to have been an infinitely valuable method, and it probably affords one of the reasons why the French army-surgeons of that day were the best in the world.

In May, 1797, Larrey set out as Chief Surgeon of the Army of Italy, which had been recently placed under the command of General Bonaparte. Since Napoleon and Larrey had met for the first time at Toulon, the former had gone through many trials, and had achieved some notable triumphs. He had lost his commission; had been harassed by poverty; had walked along the streets of Paris contemplating suicide; had thought of going to Turkey to fight under the Sultan; had, in a critical moment, when all others were afraid, accepted the command of the city from Barras; and had defeated the National Guard, which, at the behest of the Sections, had come thirty thousand strong, to attack the Convention. As a reward for this achievement—in fact, probably as the price of it—the command of the Army of Italy had been given him; and he had married Josephine de Beauharnais, whom he had met at Madame Tallien's. At the age of twenty-eight years, this remarkable man had won a coveted object of his ambition, the command of an active army about to enter a campaign.

While Larrey was proceeding to Italy, he saw, among the Alps, the victims of goiter and the cretins. They interested him a great deal; and he believed that the drinking of snow-water was responsible for the conditions. The difference between travel then and now is well exemplified by the fact that the surgeon had to wait forty-eight days at the foot of Mt. Cenis, owing to the snow-drifts and the avalanches.

He visited most of the important towns of northern Italy, establishing schools of military surgery. He was particularly interested in Venice, a city then noted for its gaiety, its luxury, and its indolence. The contrast between the voluptuous, luxurious Venetians and the rough and hardy French soldiers is shown in the well-known pictures by Georges Clairin. The French are encamped in front of the Ducal Palace. Some soldiers and a woman are preparing dinner, and some men are resting on a great pile of straw. A grim, white-moustached, red-vested revolutionary soldier, with a gun in his hand, is looking with unspeakable disgust at the dandies of Venice, who, arrayed in laces and silks of many colors, are gazing at him with languid surprise and supercilious disgust.

Larrey tells us in his Memoirs that the Winged Lion, which he then saw in the Square of St. Mark, now adorns the Esplanade of the Invalides at Paris. It did adorn this for a while, but it went back again after the fall of Napoleon. Our traveler was very much struck with the Cathedral and the four gilded bronze Corinthian horses that surmount the front

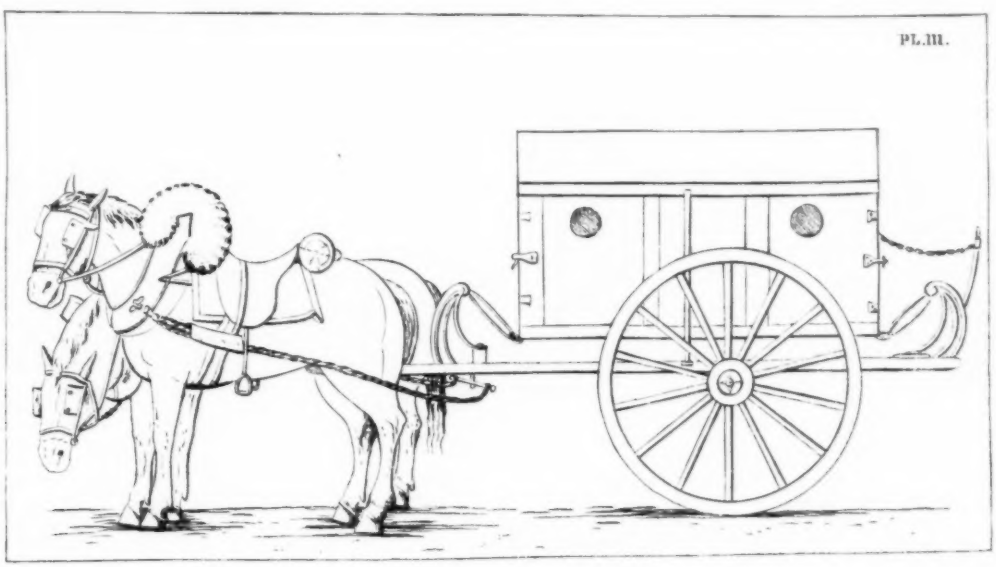

FIG. 2.—AMBULANCE (LARREY'S MEMOIRS).

piece. These horses had been found, centuries before, on the Island of Chios; had been taken to Alexandria; removed to Rome by Augustus Cæsar; taken to Constantinople by Constantine; and to Venice by the Doge Dandalus, who captured Constantinople in 1204. Larrey says that these horses have also been transported to Paris, and are now on the Triumphal Arch of the Tuilleries. This arch is what we, at the present day, call the Arch of the Carrousel; and it has horses on it, but they are not the genuine horses from Venice. They were taken home again, as was the Winged Lion—a commentary, both these circumstances, on the mutability of human affairs.

The gondolas interested Larrey greatly, and he describes them in his journal. We cannot help but think of Byron's description in a few words, when he says that a gondola is like "a coffin clapt in a canoe."

We gather from Larrey's account that the well-to-do inhabi-

tants of Venice had a reasonably comfortable life. The custom of a fashionable Venetian was to rise from bed between two and three o'clock in the afternoon; to pass the remainder of the daylight in his apartment, clad only in a morning robe; to take a light meal, array himself in his finest, and walk to the Square of St. Mark or some adjacent island; to idle about for a time; to go to dinner, and then to the theatre, which did not begin until nine o'clock and did not let out until about one in the morning. After leaving the theatre, he would pay any ceremonial calls he had to make, going from place to place in a gondola; keeping on making visits until five o'clock—or perhaps six—in the morning; and then going home to bed. The law forced the workingmen whose occupations produced noise to live in a remote section of the town, so that the day-slumbers of illustrious personages might not be disturbed.

While traveling to Trieste, Larrey met Desaix, already a well-known general, who was soon to go with Napoleon to Egypt and to return with him, only to be killed at Marengo. The surgeon became very fond of Desaix and regarded him as a most lovable character. We remember Desaix at Marengo. Bonaparte said: "The battle is lost." Desaix looked at his watch, found the hour was four o'clock, and said: "Yes, this battle is lost; but there is time to win another." The other battle was won. Desaix was killed; and long years afterward Napoleon said that had Desaix lived, he would have made him a king.

When at Pavia, the surgeon called on Spalanzi and Scarpa. The latter gave him a copy of his recent treatise on the nerves of the heart. Scarpa's dissections of the nerves of the heart were studied by Larrey with the utmost interest. He greatly preferred them to the wax models of all the different portions of the human system copied from those in Florence; because he loved reality more than imitation, however accurate the latter might be.

Larrey was ordered to Toulon, with directions to prepare to assume the position of Surgeon in Chief to the expedition that was to go to Egypt and Syria under General Bonaparte. The Chief Surgeon wrote a letter to the medical schools of Montpelier and Toulouse, requesting them to send him at once a number of intelligent young surgeons whose health justified the belief that they could stand the fatigues of a most laborious campaign. This request met with an ample response, and Larrey appointed those that suited him. How differently it would have been done in this country! It would not have been possible for the Surgeon General of our army to write to any non-political bodies to send him capable men; for these capable men could not have been appointed, unless they had had political endorsements; and most medical men with high political endorsements are not capable men. In this country, United States Senators, Congressmen, and other outcasts, would have sent peremptory orders to the War Department as to who was to be appointed; and most of them would have been appointed, irrespective of their fitness. I am not, of course, speaking of the regular army-surgeons, who enter by examination; but of the volunteer-surgeons, who go out in time of war.

This expedition had a Chief Physician, as well as a Chief Surgeon. The Chief Physician was Desgenettes, a most humane and able man. The expedition embarked on the 13th of May, 1793; and its leader was filled with enthusiasm as to its destiny. The idea of conquering Egypt was not a new one to the French mind. Four centuries before, Philip le Bel had thought of it. Sixty years before, D'Argenson had suggested the cutting of the Suez Canal; and Choiseul had advocated the conquest of Egypt, because it was the highroad between the East and the West. This remarkable expedition carried the name of Bonaparte into the remotest parts of Asia, and led the Mamelukes and the Arabs to think that he was invincible and to call him El Kebir, the Exalted One; and through all these countries, his fame still lingers in stories and traditions.

Ever since, as a boy, he had read Plutarch and of the achievements of Alexander the Great, Napoleon had dreamed of and longed for the East. When in Paris without an occupation, his thoughts had turned to the East for a career. He went there as a poet goes to the source of his inspiration; and while there, he acted a veritable epic. During all the rest of his life, and particularly near its close, when at St. Helena, he regretted that he had failed to found an Empire of the East.

In this Eastern Campaign, we see some of the most impressive and some of the most dramatic events in the marvelous career of Napoleon. At Alexandria; near Cairo at the Pyramids, when he called upon forty centuries to look upon their deeds; at the bombardment of Jaffa; at the bloody, desperate, and unfortunate siege of Acre; at Mt. Tabor; and at Aboukir. Traveling the fiery deserts on a camel, sharing all the hardships of his soldiers, he was the great, forceful, inscrutable figure that ever since has entranced the imaginations of men.

He took with him on this expedition some of the best soldiers of France. He took Desaix, who afterwards won the battle of Marengo and was killed there, and whom he said he would have made a king. He took Kleber, who was assassinated in the East. He took Berthier, who was so long his close companion; Menou, who turned Mohammedan; Davout, who afterward won Auerstadt and became one of the most celebrated marshals of France; Murat, the cavalry-leader who surprised the very Mamelukes by the splendor of his horsemanship, and who later became King of Naples; and his close friend, Lannes, who afterward became Marshal of France and Duke of Montebello, who lost his life at Essling, and of whom Napoleon said: "He was the most distinguished soldier in my army."

Three of the colonels in this expedition came later to great celebrity: Marmont, who became a marshal and a duke; Junot, who became one of the best known of the generals and a duke; and Bessières, who became Marshal, Duke of Istria, and Commander of the Imperial Guard, and who lost his life at Lützen. One hundred scientists skilled in various sciences, many of them students of the East, were taken along to study the country, the people, the inscriptions, etc. One find of these

learned men was the Rosetta Stone, the key by which the hieroglyphics were deciphered by Young and Champollion.

The expedition visited Malta, which was still ruled by that curious Order, the Knights of Malta, and had been so ruled since 1530. Napoleon broke up the Order and placed the Island under the flag of France; but, three months after he had left, it was captured by Lord Nelson; and it has been an English possession ever since.

Larrey participated in all the dangers and troubles of this most harassing campaign. At Acre, he was wounded; and Napoleon complimented him in public for his gallantry and usefulness. It was at this battle that the general saw that the surgeon was dismounted, gave him his own horse, and directed that the horses of the staff be placed at the disposal of the Surgeon General to assist in removing the wounded soldiers. He had the satisfaction, he tells us, of bringing all the wounded off, and thus saving them from the Arabs. After the battle, Bonaparte presented Larrey with a sword of honor; on account of his having operated, in the very midst of a conflict, upon one of the best generals, General Fougières. This operation was an amputation at the shoulder-joint, and was done by the method that we still call Larrey's amputation. This sword was engraved, by the order of Napoleon after he became Emperor, with the words, "Aboukir and Larrey"; and Larrey wore it nearly all the rest of his active military life. When he was captured at Waterloo, it was stolen from him by the Prussians.

On one occasion during this campaign, the men were obliged to kill their horses to make soup of them. Larrey, in speaking of a later campaign, tells of flavoring soup with gunpowder, as a substitute for salt. He was constantly in the very midst of the plague, but he never took the disease. In the course of eight weeks, in one plague-hospital, every nurse that had started in died of the disease; as well as three physicians, fourteen surgeons, and eleven apothecaries (see the Memoirs).

The journal of Larrey's campaign in Egypt and Syria is rich in striking incidents. He shows us how afraid the soldiers were of being bitten by scorpions, and yet that the bites were not dangerous; that severe home-sickness compelled certain persons to return to France; and that the Commander-in-Chief was kicked by a horse, contusing his right leg severely, and threatening dangerous consequences. Larrey succeeded in curing this injury, in spite of the marches and the great activity of the general, which prevented him from giving the hurt member rest. Larrey also tells us of a hernia that became strangulated and gangrenous, and killed a man in the space of two hours. He speaks of the wounds inflicted by the swords of the Mamelukes. One chief of brigade had seven severe wounds; two on the shoulders, cutting through the muscles and some of the bones, and one on the back, cutting through the muscles and through the spinous processes of the dorsal vertebræ. He also had a bullet in the chest, producing a copious effusion of blood in the pleural sac, and followed by empyema; but he recovered.

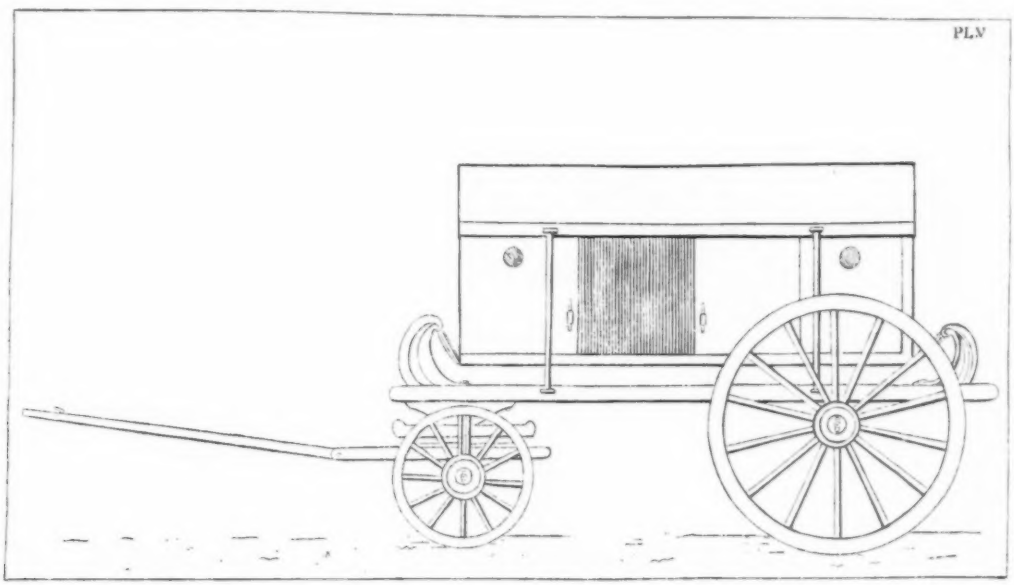

FIG. 3.—AMBULANCE (LARREY'S MEMOIRS).

Larrey trephined a number of cases, and warmly advocated operation for meningeal hemorrhage, recording successful cases. He describes cases in which leeches lodged in the nose and naso-pharynx, and remained there for weeks before the condition was understood, producing exhausting hemorrhage. He blames bad water for liver-abscess; and also for nervous putrid fever with bloody fluxes, which was probably typhoid. He points out that the inhabitants protect themselves from

plague by inserting setons; that pannier-bearing camels were used to carry wounded men; and that maggots in wounds hastened the processes of nature and rapidly removed dead material. He tells us of the establishing of a school of practical surgery at Cairo; and discusses that dreadful disease, the Egyptian ophthalmia, which caused much blindness. We learn that many amputations were necessary, owing to the character of the missiles used by the enemy. He describes the bas-reliefs in the ruins of Luxor, representing surgical instruments similar to those used at the present time for amputating.

Tetanus seems to have been a veritable scourge among the French, killing many men; and it must have been a haunting nightmare to the surgeon. Larrey believed that when the body bent back into opisthotonos, the prognosis was much worse than when it bent forward into emprosthotonos. He insisted on the causative influence of a wound in this disease, and believed that cold and wet helped tetanus to develop. He advocates incision and cauterization in tetanus, if the wound is on the face or the body; and amputation, if it is on an extremity. He gives some notable examples of recovery from tetanus. One is the case of the celebrated General Lannes, who was wounded at Aboukir, and whom Larrey treated merely with internal remedies, emollient applications, and bleeding. General d'Estaing developed this disease after a wound through the right arm, and Larrey says that he cured him by amputation.

He tells us that at the Siege of Acre there were two thousand wounded; and that seventy amputations were performed, two of them being hip-joint amputations. One of these patients seemed on the high-road to recovery, when he took the plague and died of it. The other one died of shock. At the time, it was considered useless to attempt hip-joint amputation. Larrey advocated it, in spite of Pott's view "that it is a bloody, dreadful, and unjustifiable procedure." Larrey was seven years ahead of Brashear of Kentucky in its advocacy. In his later campaigns, he twice performed this operation with success, although Brashear's success in 1806 antedated Larrey's by several years. Larrey did six amputations at the shoulder-joint, and four of them were successful. He trephined seven cases, and five were cured. General Caffarelli received a compound gun-shot fracture of the elbow-joint. The arm was amputated; but he developed "a nervous fever," and died of it. Undoubtedly, however, this fever was pyemia; for the postmortem examination disclosed an abscess of the liver and an abscess of the lung. General Murat, afterwards Marshal of France and King of Naples, received a serious gunshot wound. A bullet entered the neck, below the angle of the jaw, on the right side; and emerged on the left side, passing in front of the jugulars, injuring the ninth pair of nerves, and traversing the mouth. He was cured. M. Duroc, afterwards Grand Marshal of the Palace, received an enormous wound of the right thigh by the bursting of a bomb. Eugene de Beauharnais, Bonaparte's stepson, received a grave wound of the orbit. Both these gentlemen recovered. General Lannes was wounded again, by a bullet striking him in the face and passing behind the ear. M. Arrighi, afterwards Duke of Padua, received a wound that divided the external carotid artery. One of the soldiers put his finger into the wound, to arrest the bleeding temporarily by pressure; and Larrey was obliged to go to his assistance "in the midst of a shower of bullets." He arrested the bleeding, strange to say, by the use of a compress and a bandage.

He tells us that the wounds often became full of maggots, the larvæ of the blue flies of Syria. He gives full accounts of the plague, in all its horrors; speaks of the marvelous endurance and great bravery of Bonaparte; tells the story of the sacking of Jaffa, and of the martial deeds of Kleber; and mentions men that swallowed leeches in their drinking-water, in spite of the efforts to keep them from drinking from the pools. He speaks of abscess of the liver, and says that there were many cures. His rule was to open it when it had become glued to the surface. He writes of atrophy of the testis; of leprosy; of elephantiasis; of the death of Kleber, and of the military brilliancy of Desaix; of scurvy, syphilis, Arabian horses, Syrian midwives, abortionists, slaves, women, baths, seraglios, embalming, mummies, camels, sarcocele, wounds of the head and incubators—truly a wide variety of subjects exhibiting enormous intellectual activity. He was very much interested in the bathing-habits of the women, and engaged in the questionable proceeding of getting a female physician who was matron and proprietor of a bath at Cairo, to allow him to witness ladies bathing. He saw them through a small opening that commanded a complete view and also enabled him to hear. He describes the scene in an entertaining manner, and it evidently afforded him considerable personal satisfaction. He says that they "relate the adventures of the seraglio, dispute with each other of their charms and of the favors that they have received from the sultans."

Napoleon, it will be remembered, returned home on account of the critical state of public affairs and the peculiar conduct of Josephine. The army had been left under the command of Kleber. Kleber was assassinated by a fanatic, and Menou took command. The entire absence of re-enforcements and supplies finally necessitated surrender. Alexandria was given up, and the army received all the honors of war. The officers and soldiers were returned to France in British vessels. In 1801, Larrey came back to Toulon. Thus ended the famous expedition to the East.

After his return, on the 24th of December, 1801, the following letters were issued by the War Department: The first was one stating that the Commander-in-Chief had notified the Government of the devotion and success of Larrey and his colleagues in preserving the army. The next letter, dated January 8th, and signed by Berthier, tells Larrey that he has rendered most important service and has received the particular attention of the First Consul. The third is dated the 28th of January, and states that the Government has lost no chance to let the French Nation know of the services rendered by Larrey in Egypt, and tells him that his name will henceforth be regarded as that of a benefactor of his country. It also

says that fifteen thousand francs had been sent to his wife, as a very small testimonial of gratitude; and that, to the personal knowledge of the writer, Larrey, with his brave associates, had attended the wounded under the fiercest fire, and even in the trenches.

The Revolution of the 18th Brumaire had cast the imbecile Directory out of power. The new Constitution, which was largely the work of the Abbé Sieyes, had established the Consular Government; and Napoleon had become First Consul. He was practically a king, without the title. He moved into the Tuilleries in the beginning of the year 1800, and was soon afterward made First Consul for life.

It will be remembered that Larrey had remained in the East for a long time after Napoleon's return; and the Second Italian War, with its magnificent triumphs—the war in which the Battle of Marengo occurred—was fought before the surgeon returned. On his arrival, he was received most affectionately by the First Consul; and was made the Chief Surgeon to the Consular Guards a few days before the signing of the Treaty of Amiens, which made peace between France and England. It was just about this time that the famous Concordat was drawn up, the agreement or understanding between France and the Papacy that has been under active discussion in the newspapers within recent months. Soon after Larrey arrived at Paris, he commenced a course of lectures to a very large number of students; and it is extremely interesting to find that at that early day in surgery, he was lecturing on Experimental Surgery, a branch that is still rarely taught and too rarely thought about.

In March, 1804, Napoleon became Emperor of the French. In the interval between his assumption of the office of First Consul and his becoming Emperor, his labors had been unceasing and marvelous. He had conquered Italy; had made peace with England; had adjusted matters with the Papacy; had built roads and canals, improved the drainage and the water-supply of Paris, created numerous industries; had stimulated ship-building, science, and art; had become President of the Cisalpine Republic; had encouraged education—particularly the higher education, and had, with Cambaceres and others, drawn up the Code Napoleon, which is the basis of the criminal law of France to-day.

The peace with England was broken in 1803; and Napoleon gathered a large army in the neighborhood of Boulogne, with the intention of invading England. He had been beset by the Chouan Conspiracy, headed by Georges Cadoudal, General Pichegru, and probably Moreau. He had instigated—or, at least, accepted—the execution of the Duc d'Enghien. Soon after having been made Emperor, he also became King of Italy, and appointed his step-son, Eugene de Beauharnais, as Viceroy.

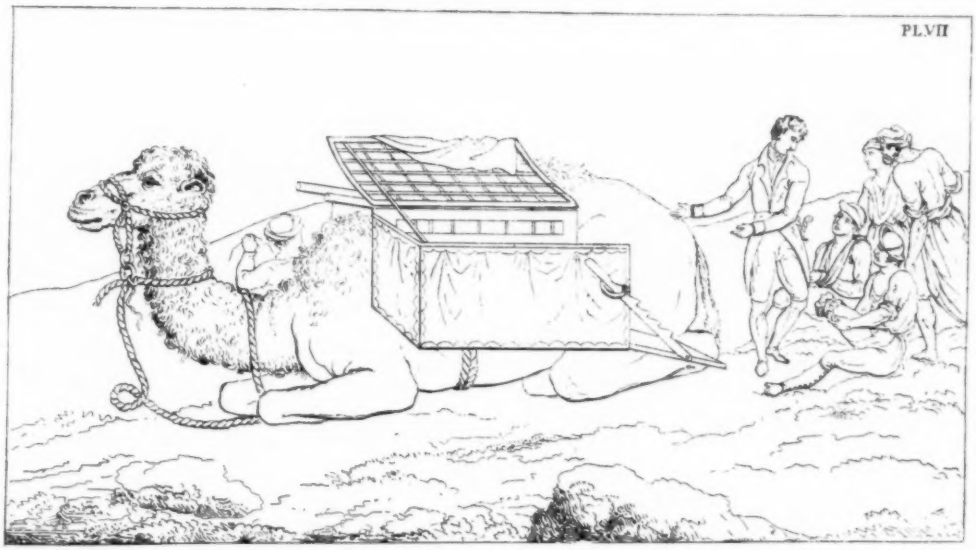

FIG. 4.—PANNIER-BEARING CAMEL FOR THE WOUNDED (LARREY'S MEMOIRS).

Larrey tells us in his Memoirs that the Emperor made mighty preparations for the invasion of England, and gathered vessels in every harbor and soldiers at every port. Larrey, who was now Chief Surgeon of the Imperial Guard, went with his master to Boulogne. At this time, as never before, the Emperor felt the need of a great admiral. The Channel was practically open, and all he required was the convoy; but the convoy did not come. At the most, there were probably but a few thousand regular troops in England; and could his army of veterans have crossed what Gladstone called the silver streak of the Channel, it seems as though London would have fallen. But the splendid activity of the English navy, in contrast to the supine imbecility of the French navy, together with the violent storms that beset the coast, hindered the pas-

sage. Just at this time, too, the European Coalition against the French power was formed, having been instigated by Austria.

Without a moment's hesitation, Napoleon turned this gigantic army, marched it through France, crossed the Rhine, and was in Germany almost before the enemy knew that a single man had started. It was just then that Lord Nelson defeated the combined French and Spanish fleets in the memorable Battle of Trafalgar. Napoleon, as we have said, always wanted an admiral and never found one. It is an interesting speculation what might have happened had Paul Jones lived but a few years longer. It seems more than probable that he would have been the admiral that the Emperor was seeking. Had this daring sailor and most capable seaman been in command of the French forces at Trafalgar, perhaps history might have had a different story to tell.

Larrey, as Chief Surgeon of the Imperial Guard, was under the direct orders of Marshal Bessières, the soldier in command of the Guard. The surgeon went to Strasburg and organized his ambulances, and the army marched rapidly toward the Danube. The Austrians were quickly cooped up in Ulm, where almost their whole army was lost. This was done by a masterly piece of strategy. They were unable to sustain a siege, because there were no stores in the city. The remainder of the Austrians retreated toward Vienna, and the French followed them. While passing a few days in Munich, Larrey again visited Sömmering; and, although in the midst of the fierce excitement of war, he made a study of the anatomical museum. The Emperor soon established his headquarters at Schönbrunn, and the Marshal Prince Murat occupied Vienna.

This campaign throughout had been one of exposure, with almost constant snow or rain. The marches had been hard and harassing. The haste had been so great that there had been difficulty in transporting baggage, and even necessary articles had been left behind; yet there were very few sick. Larrey says, in his Memoirs, that as he watched the development of the army at this time, he was satisfied that the French soldiers were becoming more robust; and he insists that a soldier will stand almost any fatigue, if he gets sufficient food. This view confirms the axiom of Frederick the Great, that "an army, like a serpent, travels on its belly."

The portion of the Austrian army that had escaped from Vienna retired into Moravia, to effect a junction with the Russian army; and the Emperor Napoleon set out to meet them. He found them in a little town in Moravia, in the neighborhood of Brunn. The name of this town will always be remembered. It is Austerlitz.

The Battle of Austerlitz was the greatest victory that Napoleon ever won. It is often called the Battle of the Three Emperors; the Emperors of Austria and Russia being on the one side, and the Emperor of the French on the other. Napoleon had about eighty thousand men; the allies, in the neighborhood of one hundred thousand.

The direction of the Medical Corps of the army was in the hands of Larrey, Baron Percy having remained in Vienna. The night before the battle, the Emperor, without warning, rode along the French line. Larrey tells us that the army "was electrified by his presence. By a unanimous and spontaneous motion, the whole army grasped wisps of straw and set them on fire; and in a moment, you beheld a new kind of illumination, symmetrical and brilliant, by more than forty-five thousand men."

The rain stopped during the night. Napoleon watched the sun rise through the mists on the morning of the battle; and his mystical nature was impressed with it as a favorable omen. He always referred to it subsequently as the "sun of Austerlitz." At seven o'clock in the morning, the battle began; and the Russians and Austrians were completely destroyed. A portion of the allied army tried to escape by crossing a frozen lake; but the French artillery fired at the ice with cannon and broke it up, and thousands drowned. Marshal Soult, the Duke of Dalmatia, was the hero of the combat, and bore the brunt of it on the French side.

In this battle, Larrey tells us, the enemy lost forty stands of colors, five hundred pieces of cannon, twenty generals, thirty thousand prisoners, and twelve thousand killed; besides thousands of wounded, who were transported to Brunn. Almost all the wounded of the French army were dressed on the field of battle. Inspector General Percy returned during the height of the engagement, and took charge of the General Medical Staff; and Larrey returned to his own position with the Imperial Guard. He had established a field-hospital in a granary, and the French wounded were quickly removed there and satisfactorily cared for. He says that no battlefield ever presented such a fearful picture of destruction as did Austerlitz. The day afterward, the French wounded were taken into Brunn, to quarters that had previously been prepared for their reception. Colonel Morlan, of the Chasseurs, had been killed in the combat. The Emperor was very fond of him and desired Larrey to embalm the body, which he did most successfully by methods he had learned in Egypt. Soon after the battle, the Treaty of Presburg was signed, which forced Austria to give up Venice, the Austrian Tyrol, and Suabia.

Larrey describes the appearance of an epidemic disease in Brunn, among the French and the Russians. He speaks of it as a "malignant, nervous, and putrid hospital-fever (adynmico-ataxick)." It was characterized by severe headache, chills, and fever. The wounds that existed tended to become putrid and gangrenous. There was a quick and irregular pulse, turbid urine, and usually diarrhœa. There were also tremor of the limbs, subsultus tendinum, delirium, pain in the belly, sweating, bleeding from the nose, and discharges from the bowel of black blood. The tongue was black in the center, and dry and red at the edges; and there were sordes on the gums and teeth. The patient was heavy and drowsy, and tended to become insensible. There was a most remarkable change in the features of the face; and when this facial condition, which was surely the Hippocratic face, was noticed early, it was always regarded as of fatal augury. The sick person passed into very great debility, and often sank and died.

Some patients died on the ninth, and some even on the seventh day of the disease. In this account, Larrey unquestionably describes typhoid fever, confusing it, perhaps, in some instances, with hospital-gangrene.

Soon after this period, Larrey returned to Paris and again took up teaching. His Memoirs contain at this point an essay on aneurysm, in which he maintains that this condition arises only in a diseased artery, and that very frequently the artery has been diseased by syphilis. He also discusses the effect of rheumatism on the fibrous and osseous structures, and considers movable and preternatural cartilages of the joints. He tells us that the first instance of movable cartilage of the knee was reported by Ambroise Paré in 1558. This surgeon opened a suppurating knee-joint, and a concretion about the size of an almond emerged. Larrey gives the other reported cases, and shows how many had been operated upon with success—particularly by his own masters, Sabatier and Desault. It is rather horrifying to us to-day to think of opening knee-joints without asepsis, for the purpose of removing these movable bodies; and yet, Larrey seems to have operated with very great success. He also considers the subject of epilepsy, as met with among the soldiers; and says that in many instances mercurial treatment was curative; thus agreeing with our modern view that epilepsy that begins late in life,—that is, after youth,—if not alcoholic or due to organic brain-disease, is usually syphilitic.

His memoir on amputations is a very important one, and somewhat lengthy. In it, he strongly advocates immediate amputation for certain serious injuries. In amputating in continuity, he employed the circular method, using several cuts. He did not sew up his flaps, but retained the edges together merely by applying a roller-bandage with a piece of lint over the wound. His operations were remarkably successful, probably because he had the freest kind of drainage and did not cover the wounds with foul and nasty greases, which would retain discharges. In confirmation of his views as to the value of early amputation, he quotes what he had heard of the experience of surgeons during the War of the American Revolution. He says that at this period the French surgeons would not amputate until late in the case, but that the American had the courage to amputate at once or within twenty-four hours. The mortality among the French was large, and among the Americans very small; yet the French hospitals were infinitely superior to the American. We thus see that even at this early day, American surgeons had independent convictions and the courage to carry them out.

Not a great while after the battle of Austerlitz, Prussia, undeterred by the lesson just administered to Austria and Russia, made a league with Saxony and began war. The Emperor immediately took the field, and very soon the great Battle of Jena was won. There was some difficulty here about the ambulances. They were too far back of the line of battle, and there was considerable delay in dressing the gravely wounded. Larrey insists upon the necessity of placing the ambulances near the line of battle, and of establishing a headquarters to which the wounded requiring serious operations can be rapidly taken. He says that those dangerously wounded must be attended to first, entirely without regard to their rank or distinction; and that those less severely injured must wait until the gravely hurt have been operated upon and dressed. The slightly wounded can go to the hospital of the first or second line, especially officers; because officers have horses to transport them, and these merely trivial wounds do not immediately endanger life. The Emperor marched his army into Berlin, and the magistrates handed over to him the keys of the city. He also took back with him to Paris the sword of Frederick the Great. Prussia had to wait a great many years; but she frightfully punished her old conquerors in the fearful war of '70-'71; and now again France bends all her energies to keep up her army to the highest level, in the hope that she may take vengeance upon Germany and march her soldiers beneath the linden trees.

While in Berlin, Larrey visited the distinguished physicians and scientists; and his relations with them seem to have been agreeable. He was particularly indebted to Humboldt, the great explorer; and to the elder and younger Walther, the eminent surgeons. A great many French soldiers, while in Berlin, became asphyxiated through having slept in rooms containing the stoves used by the inhabitants, after having closed the doors and windows. It was in Berlin that the ravages of syphilis were particularly noticeable in the army.

The next campaign participated in by Larrey was that in Poland, where he saw for the first time that remarkable disease, plica polonica. He noted that it was most common among the Jews, and regarded it as a result of syphilis—especially of hereditary syphilis. He took part in the fearful battles of Eylau and Friedland. Eylau is in East Prussia, twenty-two miles from Königsberg; Friedland is in East Prussia, twenty-six miles from Königsberg. After the Battle of Eylau, both Larrey and Percy were made Commanders of the Legion of Honor. At this point in the Memoirs, there is a treatise on dry gangrene produced by frost, which he calls gangrene from congelation. In Poland, he saw a number of cases of anthrax, which he thought came from eating the meat of animals that had the disease. In this campaign, for the second time, Larrey made a counter-opening in the cranium to reach a bullet. He introduced a gum-elastic catheter as a probe, and trephined over the point of it. He found a flattened bullet on the inside of the bone. The patient died five days afterwards, of hospital-fever.

At Tilsit, peace was made, the monarchs meeting on a pontoon anchored in the middle of the river. Königsberg interested Larrey greatly. Here he saw the point of a javelin that had been within the cranium of the Chevalier Erasmus for fourteen years without impairing his faculties. An abscess formed in the frontal region. It was opened, and this piece of javelin was removed. Larrey thinks that the javelin had probably been in the frontal sinus. He recalls that he himself saw a French soldier that, a little while after the Polish campaign, had had his head pierced with an iron-

ramrod from a gun accidentally discharged. He had no bad symptoms at all, although it seems that the ramrod must have penetrated the brain. In Königsberg, the surgeon also saw a knife that a man had swallowed in 1613. Dr. Gruger, a Polish surgeon, had performed gastrotomy successfully; and the man had lived for ten years afterward. Larrey recalls that once, while he was a pupil, he had seen M. Frizac, Professor of Surgery at Toulouse, make an incision into the abdomen parallel with the linea alba, and discovered the point of a knife sticking through the wall of the stomach. He removed this fragment of knife-blade, which was about two inches in length; sutured the stomach with two sutures; and sewed up the integument. The man recovered. The sutures used were not inversion sutures, as the Lembert suture was not introduced until the third decade of the nineteenth century. Larrey then gives an account of a soldier of the guard who was wounded in the left extremity of the stomach by the point of a saber, which penetrated the thorax between the seventh and eighth ribs; injured the lung; split the diaphragm; and entered the stomach. The man vomited blood, and fluids that he had swallowed escaped from the wound. He was very ill for several days. Cooling medicine and emollient enemata were given, and venesection was performed. He was made to lie continuously on the right side. The wound healed without trouble. He got entirely well, and became one of the veterans of the Old Guard. The only difficulty left as a legacy was a hernia of the lung, which he kept in place by wearing a bandage.

After this campaign, Larrey again returned to Paris, where he received from the Emperor the title of Knight of the Iron Crown and was decorated with the insignia of that order. His Memoirs set forth next the stories of the campaigns in Spain. On his way to Spain, he visited Toulouse and demonstrated to the students of the College the views of Dr. Gall, which have been perverted of recent years, and have been utilized by the quack and the imposter; yet Gall sems to have been the first man that ever really indicated the localization of cerebral functions. Larrey also visited his own birth-place, and became much interested in studying goiter in the Pyrenees. He disliked the bull-fights of Spain very much, and thought that they should be disapproved by all that love tranquility and by all that are humane.

In Spain, as elsewhere, Larrey founded his military school and lectured on clinical surgery. He was in many fierce battles, and had numerous striking experiences. At one time, a hospital was attacked by Spaniards; and he, and the surgeons and the convalescents, were obliged to take up guns and defend it.

He reports interesting cases of wounds of the brain; of penetrating wounds of the thorax; and of abdominal wounds with protrusion of the intestines, followed by recovery. He considers traumatic gangrene and the Madrid colic, which he thinks was due to some deleterious properties in the wine sold by the people, but which some of the French surgeons thought was due to the wine having been actually poisoned. In order to reach a conclusion as to the action of poisons and the way to treat cases of poisoning, he says that experiments should be made on living animals, in order to find remedies to counteract the poisonous effects. He was much impressed with the virtue of calisaya bark in treating intermittants.

He gives the following interesting case, which happened to Marshal Lannes, Duke of Montebello: The Marshal's horse fell down on a mountain covered with frozen snow; and, as a consequence, Lannes was severely bruised about the thorax and abdomen, and seemed to be gravely injured. He was completely covered with bruises. His abdomen was distended and very tender. He had violent pain and dyspnea, and could not voluntarily move. His pulse was small and tense. His face was deadly pale. His voice was weak, and his extremities were cold. The very slightest touch of the abdomen produced agonizing pain.

Larrey recalled a wonderful cure that he had seen made by the Esquimaux on some sailors of the Vigilante, whose boat had been cast against the rocks. These sailors had been dreadfully bruised. Larrey tried the same treatment, and afterwards used it on others besides the Marshal with success. He got a large sheep and had it stunned by a sudden blow on the neck, and two excellent butchers quickly flayed it. While this was being done, the Duke was greased all over with camphorated oil of camomile. His body was then completely wrapped in the skin of the sheep, which had been taken warm from its back. This reeking skin was still covered with serous fluid, and it was fastened together at the edges so as completely to surround the injured man's body. His extremities were wrapped in warm flannel, and the Marshal was allowed to take internally a light tea with lemon-juice and sugar.

His pain was very quickly relieved, although the sheep-skin pricked and irritated the skin of his body for a little while. Ten minutes after its application, he went to sleep and slept for two hours. When he awoke, the sheep skin was taken off; and it was found that he had been sweating tremendously. The sweat was wiped off, and an embrocation of warm, camphorated brandy was applied to the injured regions. Camphorated enemata and mucilaginous drinks, with milk of sweet almonds, were given him. The next morning the swelling of the abdomen had abated, and the Marshal felt very much more comfortable. It was found that his urine contained quantities of blood. He was then put into a warm bath. The aromatic embrocations were continued, and he went on duty on the fifth day, being able to ride a horse.

In the wounds inflicted in the Battle of Benevento, Larrey did not think it proper to remove the dressings that had been applied until the third day; because they had been put in place by skilful surgeons, and he was evidently opposed to the meddling interference that is so often productive of harm. One of the Mamelukes, Ibrahim, received a pistol-shot wound of the knee-joint that fractured the patella. Larrey removed the separated bone-fragments, and this man recovered completely.

Larrey lays down the rule that in any severe wound of a

hinge joint, the surgeon should always take amputation into consideration; and before the days of antiseptic surgery, this must unquestionably have been sound practice.

We learn from the Memoirs that a Dragoon of the Guard received a saber-cut in the right inguinal region. The abdomen was opened, and the epigastric artery was cut. A large mass of the great omentum stuck out of the wound. The plug of omentum stopped the hemorrhage from the divided epigastric artery. The protruded part became cold, without tenderness, and of livid hue. Larrey cut away the part that exhibited these phenomena. He then tied the bleeding arteries, and restored the healthy portion of omentum to the abdominal cavity. The man was entirely well in six weeks.

We find the record of another remarkable case: The patient was a Chasseur of very vigorous constitution, and of a strongly amorous nature. A saber-cut received in the Battle of Benevento chopped off a large piece of the occipital bone with a portion of the dura mater, and exposed the right cerebellar lobe. Pressure upon this lobe did not cause any pain; but produced immediate vertigo, convulsions, and then syncope. Larrey removed the loose portion of the occipital bone, which was stuck to the flap, and placed the skin-flap directly in contact with the cerebellum, having retained an opening at the lower end for drainage. Quantities of fluid, which must have been cerebro-spinal fluid, were discharged at each dressing. The day after the injury, the man lost the sight of his right eye and the hearing of his right ear, and developed severe pains in the dorsal region and severe prickling, like the stinging of ants, in the testicles. These organs atrophied; and, in the space of fifteen days, reached the size of Windsor beans. The man was taken from Benevento to Valladolid, and stood the journey very well; but inflammation appeared, and the pains in the head and back became agonizing. He had convulsions; and, on attempts at swallowing, had attacks of syncope. Tetanus developed; and the patient died of it, thirty-nine days after the injury. Postmortem examination showed that there was no suppuration in the wound. There was a great contraction of the right lobe of the cerebellum. The medulla oblongata and the spinal cord were dull white, indurated and greatly shrunken; and the nerves that emerged from them were obviously atrophied. The cranium of this remarkable case was placed in Larrey's anatomical collection. The surgeon regarded this case as confirmatory of Gall's view that the cerebellum is the seat of the sexual instinct, a view long since abandoned. Larrey was aware that critical injuries impair the intellect, and states that basal and ventricular injuries produce paralysis; and that in severe injury of one hemisphere, the limbs of the opposite side are paralyzed. He also knew that even when such conditions of the limbs are old, relief may follow the performing of an operation to relieve brain-pressure on the side of the head opposite to the paralysis. He reports a case that Mumford[5] regards as undoubtedly a fracture of the base, in which there was coma and bleeding from the ears and mouth. A day after the injury, there was ecchymosis behind each mastoid, which we now call Battle's sign.

The health of the surgeon broke down in this campaign, and he consequently handed over his duties to M. Percy and returned to France. He was so ill that he was in great danger of dying. While he was still far from well, the Austrian campaign opened; and without waiting to recover his strength completely, he set out to join the army in Bavaria. On reaching Strasburg, he found that the French had beaten the Austrians at Ratisbon.

Baron Marbot, in his Memoirs, gives a most interesting account of the fight at Ratisbon. It was in this engagement that the greatest difficulty arose in surmounting the walls in making an assault. Each party that went to take the scaling ladders was destroyed by the well-directed fire of the Austrians. Fifty volunteers were called for twice to place ladders, and twice every volunteer was killed or wounded. Marbot says that every man in the army would have gone, if ordered to do so; but when volunteers were called for a third time, no one responded. Marshal Lannes, who was in command, became extremely angry. He said that he had been a grenadier before he was a marshal, and would show them that he was a grenadier yet; and he grasped a ladder and started forward with it alone. The officers were ashamed to think of his making the movement personally, so they struggled with him for the possession of the ladder. When the soldiers saw a marshal of France and his staff fighting desperately to have the honor of an enterprise, hundreds jumped forward to participate. Among those that did so were Marbot and Labédoyère, who were the first two men up the ladders. They ascended side by side and hand in hand, steadying each other as they mounted. They got over; a swarm of grenadiers followed; and the city was taken. A fine aquarelle of these two men mounting the ladders may be seen in Sloane's Life of Napoleon.

It was in the fight at Ratisbon that Napoleon was wounded for the second and last time in his life. Some rifleman from the Tyrol succeeded in just grazing him with a shot. The Emperor and Marshal Lannes were talking together when the Emperor was struck. The injury was of the right ankle. Marbot makes a mistake in one point: he says that the pain was so sharp that the Emperor leaned upon the Marshal, and that Dr. Larrey quickly arrived and said that the wound was a trifle: but Larrey did not arrive, as we learn from his Memoirs. He was then at Strasburg. It was a young surgeon that took charge of the case. He felt extremely the responsibility of his position. This was obvious to the Emperor, who counseled him to proceed just as though he were dealing with the most unimportant man in the army—which was unquestionably the best of good advice.

The army marched forward and occupied the Island of Lobau, and soon afterward fought the desperate Battle of Aspern, from the field of which the French had to fall back,

[5] "Teachings of the Old Surgeons," by J. G. Mumford.—*Boston Med. and Surg. Jour.*, October 3 and 10, 1895.

and in which Marshal Lannes was killed. There is a graphic account of this in Marbot's Memoirs.

Marbot tells us that the Marshal, tired out with his exertions, had got off his horse and was walking about with Major General Pouset. At this moment, the General was struck in the head and instantly killed. Lannes was warmly attached to the General; had, all through his life, advanced the latter's interests; and was grief-stricken at his death. The Marshal was almost overcome with grief. He walked about one hundred paces away, sat down on the side of a ditch, and seemed buried in deep thought. About fifteen minutes later, some soldiers were carrying the dead body of an officer covered with a cloak, and they stopped to rest directly in front of the Marshal. The cloak fell aside, and Lannes recognized Pouset. He cried out: "Is this terrible sight going to follow me everywhere?" He then got up; walked a little distance away; and sat down again on the edge of a ditch, with his legs crossed and his hands held over his eyes. In a moment, a three-pound shot ricochetted and struck him just where his legs were crossed. He was dreadfully injured, and Marbot rushed toward him. The Marshal said: "I am wounded, but it is nothing. Give me your hand and help me up." He tried to rise, but could not. He was suffering fearfully, and the soldiers started to carry him away. As they began to lift him, it was observed that he was not wrapped up. Some one ran and took the cloak from General Pouset's dead body, and laid it upon Lannes; but the Marshal recognized the cloak and said: "This was my poor friend's. It is covered with his blood. I will not use it. Drag me along, rather, as you can." So the grenadiers made a stretcher out of some boughs from an adjacent clump of trees, and carried the Marshal to the dressing-station, where Larrey took charge of him.

Larrey, in his Memoirs, says that a bullet of large size had struck the left knee, passed through the joint, grazed the right thigh, and lacerated the integument, and a part of the vastus internus muscle, just above the left knee-joint; and that the Marshal also suffered from concussion of the brain and general prostration—by which, of course, Larrey means shock. He says that the face was livid, the lips pale, the eyes dull and watery, the voice extremely weak, the pulse almost absent, and the intellect deranged; and that the sufferer did not at all realize his danger. The surgeon was almost overcome at the sight of this devoted old-time friend, whom he had attended in Syria, Egypt, and Spain, and whose life he had saved on several previous occasions.

Larrey at once called some of his colleagues into consultation. The wound of the right knee was of the gravest description, there being a comminuted fracture of the bones, laceration of the ligaments and tendons, and destruction of the popliteal vessels. Marbot says that Larrey was in favor of amputating the right leg; another surgeon wanted to cut off both legs; but Dr. Yvan believed the Marshal's firm character would give him a chance of cure without any amputation at all, and that the operation performed in the hot weather would kill him. Larrey says that all of them were in favor of immediate amputation; but that each of the other surgeons hesitated to perform it, because he was so sure that the result in any case would be fatal, and he hesitated to do it because his duty to the army called him elsewhere. Finally Larrey himself performed it, the operation requiring less than two minutes, and apparently causing but little pain.

The Marshal was then taken to the Island of Lobau, where the Emperor saw him, and where Larrey left him in the care of M. Paulet. He says that he left the Duke with great regret, and continues: "But I was the only inspector on the field of battle; and a great number of wounded on the island, whither they had been transported, still required our assistance. We never rested from our labor until all the wounded had been operated on and dressed."

The interview between Marshal Lannes and Napoleon has been told in many histories and memoirs, and a celebrated picture of it has been painted by Boutigny. It shows the Marshal, after his leg has been amputated and dressed, lying down, with the Emperor on his knees beside him, grasping the Marshal's hands. Larrey, with his apron still in place, stands back of them, looking upon the scene. Marbot tells us in his Memoirs that the interview between the Emperor and the Marshal was extremely touching; that Napoleon shed tears as he embraced the Marshal; and that the latter's blood stained the Emperor's white waistcoat. Marbot should have known; for he was at that minute supporting the Marshal's head and shoulders; although he is not put in the painting. Lannes was very much touched by the Emperor's grief. When Napoleon was obliged to leave, in order to provide for the safety of the army, he said: "You will live, my friend, you will live." The Marshal pressed the Emperor's hand and replied: "I trust I may, if I can still be of use to France and to Your Majesty."[6]

Marbot goes on to tell us that every moment Lannes asked the position of the troops, and exhibited pleasure when he learned that the enemy had not ventured to pursue. He asked how his wounded aides-de-camp were doing, and requested Dr. Larrey to examine Marbot's wound. Marbot says that they had to keep the Marshal all night on the island, lying on a bed of cavalry-cloaks; and that there was not even good water to give him to quench his thirst. The water of the Danube was filled with mud, and Lannes would not drink it; so Marbot devised a filter, which he made of one of the Marshal's fine shirts. This water was eagerly taken. The next day, the Emperor sent a boat to bring the Marshal to the right bank; and he was taken to a house in Ebersdorf, Marbot remaining with him.

We now return to Larrey's account in his Memoirs. On reaching Ebersdorf, he found the Marshal extremely weak, pale, and incoherent. He was very restless, suffered with dyspnœa, and sighed frequently. The next day the wounds were found to be purulent; but the stump looked well; and Larrey had some hopes of recovery. On the evening of the

[6] Marbot's Memoirs.

sixth day after the injury, a dangerous fever arose. Two hours after the first attack of fever, there was another attack; and in the course of the day, another, with delirium and gangrene. The Marshal died in the ninth day after the accident—in all probability of pyemia. Larrey had the unpleasant task of embalming the body of his old friend, so that he might be sent back to France.

After this battle, there was a dreadful mortality in the army from lock-jaw and hospital-fever. The next great battle participated in by the surgeon was the tremendous conflict of Wagram, upon which the fate of the Empire was staked. It was this fight that made Larrey a Baron of the Empire; and Macdonald, a Marshal of France. The latter had been regarded as one of the ablest soldiers of the Republic; but he was a personal friend of Moreau's, and, although he had not joined in the conspiracy with Pichegru, the Emperor was suspicious of him. Furthermore, he was a man blunt of speech, truthful to a fault, and as courageous in counsel as on the battlefield. He had come from a family noted for courage; for his father, Macdonald of Glencoe, had agreed to go with Prince Charles Edward Stuart when all the other Scottish chiefs had held back, and after the Battle of Culloden had gone to France and remained there.

The original list of Marshals was as follows: Augereau, Bernadotte, Berthier, Bessières, Brune, Davout, Jourdan, Kellermann, Lannes, Lefebvre, Masséna, Moncey, Mortier, Murat, Ney, Perignon, Sérurier, and Soult. It had caused universal comment that Macdonald had been left out of this illustrious list. The Marshals afterward appointed by Napoleon were Grouchy, Marmont, Oudinot, Poniatowski, St. Cyr, Suchet, Victor, and Macdonald. The latter said himself that, in the long run, it was worth being left out; because his achievement at Wagram caused him to have the baton of a Marshal given him on the battlefield, and to have the honor of being made a duke there—honors that had never come to anyone else on the field of battle.

Macdonald made at Wagram the charge upon which the whole battle hinged. It was his duty to break the center of the Austrian army. He had but fifteen thousand men to do it with, and one hundred cannon were playing upon them in a semi-circle. He accomplished the task; but when it was done, only fifteen hundred men were left around him. The Emperor rode up to him and said: "No more trouble between us, Macdonald. You have been reserved for a higher honor than your brothers-in-arms. I make you a Marshal here, on the field of your glory."

In contemplating the names of the illustrious soldiers that were selected as Marshals of France, one is struck by the curious fact that all but three of them seem to have begun life in humble circumstances, with very few advantages. Of these three Poniatowski, the Polish Prince, was not made a Marshal until October, 1813; and he was drowned in the Elster six days later. He was a gallant soldier and an aide to Napoleon. The stories of the other two of better origin were different. One was Marmont, and the other Grouchy; and these two men ruined the man that had made them. Marmont surrendered Paris when the Emperor had almost reached there. If it had been held but a few days longer, far different terms could have been made. Grouchy, by indecision that is simply incredible, lost the Battle of Waterloo, which should have been won.

After Wagram, a great many amputations had to be done, on account of the severity of the gun-shot wounds. In two of the Guard, amputation at the hip-joint was performed. In telling the story of one of these cases, Larrey says that he ligated the femoral artery; and then amputated at the hip-joint in fifteen seconds, without any loss of blood. One of these two patients died of shock within three hours; the other died at six o'clock the next morning.

One remarkable case was that of an artilleryman struck by a ball that had rebounded before hitting him. It buried itself behind the bone and lodged near the groin. The patient said that the ball had glanced from him and killed another artillerist. Larrey says: "On seizing the limb to amputate it, I found it unusually heavy; and I decided that there was a ball in it, as I had often seen while making incisions and during operations. Under this impression, and supposing that the thigh was injured high up, I wished to amputate with the flaps. I then made an incision parallel with the skin of the thigh, and discovered a five-pound ball, which was extracted." The surgeon then completed the amputation.

With this campaign, the second volume of the Memoirs of the surgeon is terminated. The third volume shows us that Larrey continued with Napoleon until the last. He went through all the horrors of the Russian Campaign—the cold; the exposure; and the dreadful conflict at the Borodino, in which thirty thousand Frenchmen lost their lives. He was at the desolation of Moscow, and at the passage of the Beresina, where he got safely over; but, finding that important hospital-supplies had been left behind, he took his life in his hands and went back for them. The men cried: "Let us save the man that saved us." The frantic mob gave way, and the soldiers brought him in their arms safe to the army again. He was in the hideous tramp in midwinter, from Moscow back to France; and in all the actions of the winter of 1813-14, in which Napoleon fought united Europe and contested, step by step, the road to Paris.

The genius of the great captain never shone brighter than in this period; for he won battle after battle against vastly superior numbers; but, as he had no re-enforcements and few supplies, he was compelled, slowly and gradually, but surely, to fall back. On one occasion during this campaign, he captured a whole German army corps; but the faces of the French had to turn to Paris, no matter what the result of the battles might be. We all remember that picture by Meissonier in which the Emperor and his staff, gloomy and depressed, but resolute, are going on their way back to the capital, through the desolate country, over a road cut to pieces with wagons and artillery.

When the order to send the Emperor to Elba was given,

Larrey begged to be taken along; but Napoleon would not let him go, telling him that the army needed his services, and that it was his duty to stay with it. Bonaparte returned from Elba in 1815, and the old surgeon was one of the first to welcome his Emperor. The latter, after speaking of the joy that it gave him to be thus received, expressed regret that he had left Larrey so long without a fortune, and said that he hoped soon to be able to recompense him for his services. Soon after coming back from Elba, when the colors were being distributed to the different departments, the Emperor handed the flag of the High Pyrenees to Larrey and asked him to give it to the President of that Department; saying, as he did so, that he was glad that this color should be presented by their countryman, Larrey, a man that was an honor to humanity on account of his courage and his disinterested conduct—a man that had saved great numbers from death in the deserts of the East, had given water reserved for himself to suffering soldiers in Egypt and Syria, and had always loyally and faithfully served his Emperor.

On the eve of the Battle of Waterloo, Larrey was long with Napoleon in confidential conversation, seeking to rouse him from his depression; for this great man seemed to have dipped into the future, and to have had a glimpse of what was coming.

At Waterloo, when the news of the defeat arrived, Larrey, who was involved in the rout, endeavored to reach the French frontier. He had to fight his way with sword and pistol through a party endeavoring to take him. He succeeded in getting through this party, but his horse was shot under him; and before he could get up, he was struck on the head and the left shoulder with sabers. He was left for dead where he fell; but he regained consciousness, got on a horse, and proceeded on his road. He was, however, captured afterwards. Nearly all his clothing was taken away, and the sword given him by the Emperor was also taken. He was a short man, somewhat stout, and wore a gray great-coat. He thus somewhat resembled the Emperor in appearance, and was at first taken for him. His hands were tied together, and he was brought before a Prussian officer, who saw that he was not Napoleon and ordered that he be shot. Just as the soldiers were about to fire at him, the Prussian regimental surgeon recognized Larrey and succeeded in stopping the contemplated execution. He then took the French surgeon before General Bulow, who also recognized him. The general was grieved to see this distinguished man without shoes to his feet, almost without clothing to his back, wounded, hungry, and suffering. His hands were untied, and he was taken before Marshal Blucher, who knew of him; because in the Austrian campaign Blucher's own son had been wounded and taken prisoner, and Larrey had cared for him and saved his life. The Marshal at once liberated Larrey, gave him clothing and money, and had him sent forward into France; and he soon afterward reached Paris.

When the Bourbons mounted the throne, Larrey lost his position and fell into a state of absolute poverty. His mother and one of his brothers died, and he almost made up his mind to go to the United States to practice surgery. The Emperor of Russia endeavored to secure his services in a high position with the Russian army, and Dom Pedro of Brazil made every effort to have him come to that country: but he refused both these offers.

Napoleon died in 1821, and Larrey was plunged into grief at the death of his old chief. He was greatly touched to learn that the Emperor had spoken of him in his will; had referred to him as "the most virtuous man that I have ever known"; and had left him some money, as an evidence of his continued affection.

Soon afterwards, Larrey was restored to the army. In 1826, he took a trip to England, and was received with the greatest distinction by the English surgeons. He then returned to Paris, and continued to practice and teach his profession; and he was again made Surgeon-in-Chief of the army, and Chief Surgeon of the Invalides. In the Revolution of July, 1830, which overthrew Charles X, he directed personally the care of the wounded. A year later, at the invitation of the King of Belgium, he visited all the army hospitals of that country and suggested regulations and improvements.

In 1834, he made a tour through southern France, visiting his birth-place. He was received with the greatest honor by all the citizens, and members of the Imperial Guard flocked from long distances to see him. At his birth-place, he found the Abbé de Crasset, his old instructor, still living.

In 1842, he was sent to visit the army in Algeria. He inspected it carefully, and then returned toward home; but when at Lyons, he was taken ill; and he died there on the 25th of July, 1842.

We find an interesting picture of Larrey in his old age at Paris in "A Memoir of J. Mason Warren," the father of the present distinguished Professor of Surgery in Harvard College. This interesting volume is edited by Howard Payson Arnold. Dr. Warren was a student in Paris during the reign of Louis Philippe, that greatest day of French medicine and surgery, which I have discussed in another paper;[1] the day of Dupuytren, Lisfranc, Roux, Marjolin, Civiale, Velpeau, Ricord, Falret, Trelat, Calmeil, Fauville, Dubois, Baudelocque, Guerin, Vidal-de-Cassis, Cazenave, Jobert, Lugol, Rostand, the younger Larrey, Boyer, Maisonneuve, Richerand, Blandin, Chassaignac, Hugier, Sanson, Denonvilliers, Cloquet, Amussat, Nélaton, Cullerier, Breschet, Sappey, Magendie, Andral, Gay-Lussac, Broussais, Malgaigne, and others. On November 5, 1832, Dr. Warren wrote as follows:

My dear Father.—I made a very pleasant and instructive visit, a few days since, to the Hotel des Invalides, where I attended Larrey in his wards. He is a short, corpulent man, with a very agreeable face. His hair, which is gray, falls in curls over the straight, ornamented collar of the military coat that he wears during his visits. He was very polite to Dr. Pierson, who was introduced to him by an Italian gentleman, and took great pains to show us all the remarkable cases, many of which he referred to as being described in his books. He also showed a case of

[1] "Medical Paris During the Reign of Louis Philippe," by J. Chalmers DaCosta, M. D., *University of Pa. Med. Bul.*, March, 1904.

amputating-instruments that he had had with him in Egypt. He spoke much of his inventions of different kinds, particularly of an amputating-knife with a curved blade, which, he said, cuts off the leg more expeditiously from its embracing a greater surface. I think I have heard you state in your lectures that, no matter how much a blade was curved, nothing was added to the celerity of the operation; as it cut only on one point at the same time. Larrey, however, if he has anything he thinks his own, will not give it up for anybody. The most remarkable cases were:

"1. Lower jaw shot off, the tongue hanging down upon the front of the neck. To remedy this, a curved plate was tied to the head, having a silver lip. When this was on, the man was able to articulate distinctly. He had been nourished with broth for ten or fifteen years.

"2. Three cases of disarticulation at the shoulder-joint, with a beautiful union. One of the cases had been operated on two days previously, and was doing well.

"3. Baron Larrey showed us a case of neuralgia of the arm from amputation's having been performed too low down. The flap is not sufficient, and the cicatrix presses on the bone. He says he has seen a number of cases like this, and the best remedy is to amputate again.

"He is very fond of the hot iron.[8] He says he applies it to large ulcers of the leg, forming an eschar over the whole. He stated that he had wrought some wonderful cures in erysipelas of the face by passing an iron over the whole surface. The patients were cured in twenty-four hours, but he did not say how their faces looked after the operation.

"4. He showed us a case of cataract in which the man had been totally blind, but had been restored to sight by applying moxas to the back of the neck. From this he infers that cataract always depends on inflammation of the capsule. I did not see him operate, but intend to go there again for the purpose."

We have said more than once in these pages that Larrey was noted for his truthful and decisive character, and never hesitated to tell the Emperor what he thought, even though it irritated his master. As an illustration of this, we may mention the disagreement between the Emperor and Larrey after the Battle of Bautzen. This is related in the sketch of Larrey in F. C. Stewart's book on the Hospitals and Surgeons of Paris, and is briefly referred to in Larrey's own Memoirs.

There were a very large number of wounded in the Battle of Bautzen, which misfortune Larrey attributed to the very large percentage of recent recruits present; the fierce nature of the combat; and the positions occupied by the armies. Some of the officers, who wished the war to end and wanted to get home, said that the army could not be depended on; that the troops were dissatisfied; and that the soldiers, in order to make the army go home, had in many instances wounded each other, or had pretended to have injuries that they had not sustained. The Emperor ordered Larrey and some other surgeons to examine all the wounded, so that he might signally punish anyone guilty of such a lack of patriotism.

Larrey went to the Emperor for the purpose of insisting that these statements were untrue. Napoleon was extremely angry, and told the surgeon that any observation he might make must be official, and not personal; and that he should at once go on with the duty he had been ordered to perform.

Larrey, with quiet dignity, went about this duty; and he refused to be hastened, although the Emperor was in a passion of impatience. The surgeon obtained, with the utmost care, every particular about each wounded man. He was told by his companions in arms that he had better not be so careful, and should hurry for his own good, or the Emperor would punish him; but he took the time that he knew was necessary to do this duty thoroughly and well.

When he had finished, the Emperor asked him whether he still retained his former opinion. Larrey said: "More than that, Your Majesty. I come to prove to you that our brave soldiers have been subjected to calumny. I have not discovered a single one that is guilty. There is not a wounded man that has not been examined. I have here a wagon-load of manuscripts; and I shall be pleased, if Your Majesty has them all read." Napoleon snatched the report out of Larrey's hands, and said sternly: "I will have it attended to." He then paced uneasily up and down the room; but, after a few moments, his frown broke away. He stopped before Larrey; shook him warmly by the hand; and, with every evidence of affection, said: "Good-bye, M. Larrey. A monarch is extremely lucky who is served by such men as you; and my further orders shall be conveyed to you." That same evening, the Emperor sent Larrey his portrait set with diamonds, six thousand francs in money, and a pension of three thousand francs a year. This story is creditable to both these distinguished men.

The surgeon's decision of character and willingness to assume responsibility are shown by the following anecdote: After a battle, many officers complained that their horses had been shot by Larrey's order. The Emperor sent for him and said: "Why have you dared to have these horses shot? Was it to feed the wounded?" Larrey answered simply: "Yes, Your Majesty"; and Napoleon thanked him for it.

In summing up the achievements of Baron Larrey, we should mention the following:[9]

1. The avoidance of meddlesome surgery, leaving a simple healing wound practically to take care of itself.

2. The use of warm salt-solution to wash wounds with; and the use of Labaraque's solution, a powerful antiseptic, to wash putrid and sloughing wounds.

3. The demonstration that the union of two granulating surfaces may take place, if one surface is laid against the other and the wound is cleansed frequently with an antiseptic. We call this to-day union by third intention.

4. The belief in the necessity of supporting treatment after severe injuries, stimulants and nourishing food being given the patient, instead of fierce purgatives and copious bleedings. In certain cases, Larrey fed persons with the stom-

[8] Larrey, in his Memoirs, says he used the hot iron around an area of erysipelas to prevent its spread.

[9] In this connection, see the admirable article on "Teachings of the Old Surgeons," by J. G. Mumford, in the *Boston Med. and Surg. Jour.*, October 3 and 10, 1905.

ach-tube; in others, by means of a catheter passed through the nostril, as is often done in lunatic asylums to-day.[10]

5. The demonstration of the very great value of heat in suppurating areas. We now know why heat is of such value; as it relieves circulatory stasis, and brings millions of leukocytes to encompass the area of infection. Napoleon's Surgeon General knew clinically its usefulness.

6. The view that granulating wounds require no special dressing, some ordinary non-irritating ointment being sufficient; Larrey's rule was to abandon poultices as soon as the pain abated, the inflammation disappeared, and the temperature became normal.

7. The employment of rest in the treatment of wounds. Larrey believed rest to be imperatively necessary, in order to permit nature to do her work; and he would allow a first dressing, if properly put on, to remain undisturbed for several or many days. He associated rest with judicious compression, made by bandages—particularly flannel-bandages.

8. The belief in the imperative necessity of drainage for large wounds, for certain injuries of the skull, and for some injuries in the pleural cavity.

9. The use of the conservative operation of the resection of joints. The view regarding the usefulness of this had been put forth, but three or four years before, by Mr. Park, of Liverpool; and had been originally suggested by Bilgner, the Surgeon General of Frederick the Great.[11] Larrey showed that resections save a large number of amputations.

10. The insistence upon the necessity of enlarging, by incision and drainage, all punctured wounds—a point of view not yet accepted by all practitioners.

11. Trephining for hemorrhage of the middle meningeal artery; although, strange to say, after thus having reached the bleeding vessel, Larrey arrested the bleeding with the actual cautery.

12. Trephining for depressed fracture, comminuted fracture, or any condition that causes compression of the brain.

13. The value of drainage in preventing pressure in intra-cranial hemorrhage.

14. The recognition of discoloration over the mastoid process as a result of fracture of the base—the condition we now call Battle's sign, after Mr. Battle, of St. George's Hospital, London.

15. A knowledge in advance of his time regarding the symptoms of cerebral injuries. He said that injuries of the cortex of the brain impair the intellect; that injuries of the ventricles and the base produce paralysis; and that the paralysis is on the side of the body opposite to the brain-injury. Further, he stated that even in old cases of such paralysis, good results sometimes follow trephining the opposite side of the head, to relieve pressure.

16. The view that a fungus cerebri should not be cut off, and that no effort should be made to reduce it; because the cause is actual swelling of the brain, and the only treatment that promises good results is equable compression.

17. In hemorrhage of the lung into the pleural cavity, he made a large incision. Le Cuite has recently showed us that a large incision arrests bleeding by producing pneumothorax. Larrey stated that when drainage was thus inserted, bleeding stopped and the person was safe from subsequent dangerous empyema.

18. The belief that empyemata should be operated on, and that this is a very successful operation.

19. On several occasions, in gun-shot wounds of the head, he explored the track of the bullet with a soft catheter; and, finding that the missile was on the opposite side of the cranium, he trephined on the side opposite the wound and extracted the bullet.

20. The belief in the great superiority of immediate amputation over the secondary operation so long in vogue.

21. The introduction of the flying ambulances into warfare. This method was soon imitated by every nation. It has saved countless thousands from death and from horrible agony, and may be regarded as one of the greatest of Larrey's achievements.

22. A description of adynamic ataxic fever, the typhoid of our own time; and the fact that gangrene may occur during its existence.

23. The inauguration of the custom of carefully attending to the wounded men, as well as to the wounded officers; the prisoners, as well as his own people.

24. Finally, his ideas as to reaching, removing, and caring for the wounded after the battle constitute the foundation-stones of military surgery to-day.

The name of this eminent man is on the Arch of Triumph. His statue is at the Val de Grace. His body lies in the Cemetery of Père-la-Chaise, where his monument can be seen at the present time. Near him are a number of scientists; and about him are many of those soldier-comrades with whom he marched into most of the capitals of Europe. Near him is Saint Hilaire, the naturalist; Arago, the physicist; Monge, the mathematician; Laplace, the astronomer; and Gay-Lussac, the chemist. Around him we note a group of soldiers; Marshal Masséna, who held Genoa in the great siege, who fought Wellington, and who was one of the best strategists and grimmest fighters in the army; Marshal Lefebvre, who was the first man made a noble by Napoleon, and who commanded in his will that he be buried near Masséna, adding: "We lived together in camps and combats; our ashes ought to have the same asylum;" Marshall Kellermann, one of the first generals under whom Larrey served, and the man that won Valmy; Marshal Grouchy, who had had a great reputation as a strategist, and whose inexplicable hesitation lost Waterloo; Marshal Ney, "the bravest of the brave," who commanded the rear-guard in the retreat from Russia and who was shot as a traitor by the treacherous and wretched Bourbon king; Colonel Labédoyère, who, with Baron Marbot, was the first over the walls

[10] J. G. Mumford.
[11] J. G. Mumford.

of Ratisbon; Marshal Macdonald, who won Wagram, and was made a Marshal on the field of battle, a man who was a gallant and loyal gentleman all his days: Marshal Suchet, who had been a junior officer in Napoleon's company, when the latter was a captain; Marshal Davout, the hero of Auerstadt; General Junot, whose wife Napoleon wished to marry, when she was a young girl—Junot, reckless to gallantry, who resembled Mad Anthony Wayne of our Revolutionary struggle; and General Foy, who was sent to Turkey to fight the Russians and the English, and was wounded fifteen times in his various arduous campaigns. It seems a pity that Larrey's old friend and patient, Lannes, is not near him. This celebrated Marshal's body lies in the Cemetery of Montmartre.

Those of us that go to Paris and look at the tomb of Baron Larrey can feel with justice that there is buried a soldier, a patriot; a great, learned, and brilliant surgeon; a brave, truthful, and loyal man; a gentleman; and a benefactor of the human race.

ON SOME EXPERIENCES WITH BLOOD-CULTURES IN THE STUDY OF BACTERIAL INFECTIONS.[1]

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When, a few months ago, you honored me by asking me to present something here, I was much concerned. I felt unequal to the task of addressing you, and I was at a loss as to the choice of my subject. After a few days' thought I decided that the subject which has been announced to you would be an advantageous one in a number of ways.

In the first place, I could combine the paper with a demonstration. This I was anxious to do because Professor Welch, when he was kind enough to visit our hospital last spring, expressed a wish that some of our material be presented here. In the second place, I thought that it would be of value to speak of blood-cultures here because you have been engaged in such work; the paper would, therefore, be of particular interest to you, and I could have the benefit of your opinions for our later work. And finally, the subject is one of direct interest to men engaged in nearly all the branches of medical work.

Since the fall of 1897, when I found streptococci in the blood of a child suffering from streptococcic intestinal infection (1), in the clinic of my friend and teacher, Professor Escherich, I have been much interested in systemic bacterial infections, and, during the past eight years I have attempted from time to time to study especially the general infections by the pyogenic cocci. The number of cases which we have studied by means of cultures is between 700 and 750. Not all are of value. Many were made at request in cases which proved to be examples of fever due to tuberculosis, or cases not bacterial in origin. Some were unsuccessful for one reason or another. I shall not attempt to cover the entire material—that would be impossible. Only certain points will be taken up and digressions will be made here and there so as to mention observations that are unusual or particularly interesting. The literature (2) will not be discussed as I prefer to speak at this time of our own experiences. The subject of infections by the typhoid bacillus will be omitted and only such pneumococcus infections as occurred independently of pneumonia will be included.

While the paper will not be a connected one,—the breadth of the subject prevents that—I shall take up the following main points:

1. The terminology to be used in the paper.
2. Technical considerations.
3. Organisms found, their frequency, and the types of diseases in which they were encountered.
4. Notes on osteomyelitis, secondary parotitis, intra-abdominal infections, infections of otitic origin and those arising in the genito-urinary tracts of the male and of the female.
5. Notes on certain groups of cases belonging to the domain of internal medicine.
6. Endocarditis; embolic aneurysms.
7. Discussion of negative blood-cultures.
8. Discussion of positive blood-cultures.
9. Diagnostic points.
10. The prognosis in cases in which bacteria have been found in the blood.

1. TERMINOLOGY.

The terminology (3) that I shall use is one based on the work itself and will, I hope, be justified by the observations I shall record. When bacteria attack any part of the body we call the resultant lesion a local infection. There may or may not be evident toxemia; usually there is. If such a local infection is so situated that it is not diagnosed we can call the lesion a cryptic infection. If there is toxemia we have a cryptogenetic toxemia.

If bacteria are present in the blood we have a bacteriemia, or systemic infection. Such a bacteriemia may or may not be accompanied by the establishment of secondary foci (metas-

[1] Read before the Medical Society of the Johns Hopkins Hospital, February 5, 1906.

tatic infections or so-called pyemia). If, when bacteria are in the blood, the point of infection is overlooked, or has healed or is so situated that it is not diagnosed, we are dealing with a cryptogenetic bacteriemia.

In the use of the word bacteriemia I wish to agree with those who use the term to signify the presence of bacteria in the blood without implying anything concerning the question of whether they are multiplying or not. Canon (4) uses the word bacteriemia to indicate the cases in which bacteria are discharged from a local focus and do not multiply in the blood, whereas by septicemia he refers to their multiplication in the blood. The word septicemia, if used at all, should, I believe, be used only to designate the presence of bacteria in the blood. The reasons for this will be made apparent later.

The term secondary infection is best reserved for those cases in which one bacterial infection follows another. For the occurrence of a bacterial infection in the course of a disease not bacterial in origin, the term intercurrent infection is better. By a mixed infection we mean the co-existence of infections by two or more organisms. The two infections may have occurred simultaneously, or one may be secondary. The first infection at times disappears. For secondary and mixed invasions of the blood-current we can use the terms secondary bacteriemia and mixed bacteriemia.

The term agonal invasion needs no explanation; it is not yet known how often it really occurs. The expression terminal infection (5) needs a commentary. I believe it should really be used to indicate an infection that comes when the patient is about to die of his original disease. Often, however, it is used to indicate the infection that terminates the life of a patient with a chronic disease. Not infrequently a patient in a hospital ward with a chronic nephritis or endocarditis, whose condition is supposed to be hopeless, spontaneously or as the result of treatment rallies and leaves the hospital in quite good condition for a shorter or longer time. If such a patient has the misfortune to acquire a fatal infection in the ward, he is sometimes put down as having died of a terminal infection, when in reality it was a terminating infection. It would be better, I believe, to restrict the use of the expression terminal infection and use at times the expressions secondary fatal infection and intercurrent fatal infection. This would lead to greater stress being laid on preventing such infections.

2. Technical Considerations.

In the remarks which I shall make on the technical side, I shall not go into the question of how the blood is to be obtained or the difficulties which we may meet. It is generally agreed that the amount should be large, 25 cc. if possible. We do not rely on microscopic examinations.

The question of the media to be used we must touch upon, even if briefly. For several years we have used a variety of media for each culture, so as to study their relative value, and so as to be able to state, when results were negative, that optimum methods had been used. The routine, except in cases of typhoid fever, was to use plates of agar, serum-agar, glucose-agar and serum-glucose-agar and flasks of bouillon and glucose bouillon with and without serum. When we expected to find streptococci, staphylococci or pneumococci the blood was used more concentrated. If there was no clue to the organism that was possibly present, the blood was used in varying dilutions. In obscure cases, more than one culture was necessary when all the variations in media were to be tried.

It is hardly possible to state briefly and definitely the relative value of each of these media. In cases in which only a few organisms are present it may be more difficult to decide this question than when they are numerous, as the occurrence of the organisms on one particular plate may be due to chance. At times the fluid media were better, at times the plates. Glucose-agar rarely proved to be of any greater value than ordinary agar; generally it was less favorable. Possibly at another titre it might have been better. Serum-agar often gave a better result than ordinary agar. Glucose-serum media (6) which I suggested some years ago as simple optimum media for bacterial growth, often gave an earlier result, and in some instances were the only media to show growth even when the bacteria were abundant. (This refers especially to the cocci found in certain cases of subacute endocarditis).[2] We have found these media often of advantage in routine work for cultivating the meningococcus and the gonococcus. It would be wise to use them in blood-cultures in cases in which these organisms are looked for. Staphylococci usually grow well on all media.

At times streptococci would grow in glucose-bouillon when they would not grow in ordinary bouillon, and occasionally the opposite was found. At times they seemed to grow better when the blood was well diluted, but as a rule concentrated blood was more favorable. At times streptococci and staphylococci were found in the flasks growing only in the clot at the bottom.

Media in tubes have been used very little in the past six years, but there is no doubt that in cases in which bacteria are present in very large numbers an earlier result can be obtained by pouring some blood over the surface of slanted media. In obscure cases it is wise to use one or two plates of serum-glucose-agar on the surface of which the blood is poured. This gives the possibility of using pure blood and avoids the overheating of the organisms which may occur during plating.

Glycerine-agar was found to be of no particular advantage. The Wassermann medium (7) (made of 2% Chapoteaut peptone and pork infusion with a markedly alkaline reaction) in a

[2] Although glucose-agar is not particularly advantageous we continue to use it because it serves as a control on the glucose-serum-agar. If on the serum-glucose-agar plates bacteria are found that grow easily on all media and there is no growth on the glucose-agar plates we can suspect a contamination of the serum.

couple of instances gave very good results.[3] I believe, however, that similar results are obtained by using agar made up of beef infusion with 2% Witte's or Merck's peptone with a reaction neutral to phenolphthalein.

In certain cases anaërobic work was done. Either the Novy jars or Buchner tubes were used, or the blood was mixed with glucose-agar in deep tubes according to the Veillon method. (8) This last method was used especially in case of abdominal disease. Tissier (9) has pointed out that the intestinal tract contains anaërobes that can be isolated only by the Veillon method, and we have encountered such organisms either by staining methods or in cultures in a number of intra-abdominal infections. They are also to be found in necrotic foci in the mastoid, lungs and other organs. The difficulty in using this method for blood cultures lies in the fact that a small quantity of blood makes the medium opaque and colonies cannot be seen. To carry out the method properly very many tubes would have to be used. One could think of attempting in some way to rid the blood of red corpuscles.

Before considering the findings in the positive cases, it is necessary to refer to the question of contaminations and to the methods of identifying certain organisms.

In the hands of beginners contaminations are frequent, but with experience they can be almost entirely avoided. It is advisable to study carefully all contaminating organisms, so that if one of them is found in the blood of an obscure case, it be not looked upon as the cause of the disease. Not infrequently one encounters publications in which organisms are described as being the cause of certain diseases, which organisms accurately correspond to those often met with as contaminations.

The contaminations most frequently met are *Micrococcus epidermidis albus*, Gram-positive bacilli with and without spores, Gram-negative bacilli of different kinds, organisms of the psuedo-diphtheria group and *Micrococcus tetragenus*.[4] An interesting organism occasionally met is a short Gram-negative bacillus which it is difficult to cultivate on other than blood media.

Several years ago one of the laboratory workers found a remarkable contaminating organism in two cases. It was a streptococcus growing like the ordinary streptococci on media without glucose, but growing in large mucoid masses on glucose media. It was Gram-negative. If the Gram test had not been applied and if glucose media had not been used a serious blunder would have been made. Cultures made the next day in both cases proved negative, a result more in accordance with the clinical picture.

The organisms concerning the identification of which I wish to speak are the pneumococci, streptococci, staphylococci, gonococci and meningococci.

Much of the earlier work of other observers and myself is unreliable as the methods for identifying pneumococci were not sufficiently definite in all instances. From what I have seen during the last year I believe that a few of the so-called streptococci[5] which I found in earlier cases may have been pneumococci and vice versa. This is a question into which I enter gladly because Dr. Buerger worked on that subject in our laboratory. Dr. Epstein, the present pathological interne, has been working along the same lines and so far has corroborated Dr. Buerger's results. We have, therefore, adopted them for routine work.

If the organism (Gram positive) has the typical capsule described by Dr. Buerger (10) it is a pneumococcus. This capsule or rather the capsular membrane is situated at a fair distance from the organism, stains sharply and the capsular substance (between the membrane and the organism) shows little tendency to stain. The capsule often shows indentations; these occur at the intervals between the organisms in the diplococcus-form; in chains, the indentations occur between each pair of cocci. (*Streptococcus mucosus capsulatus*[6] is almost never lancet-shaped; its capsule is at a fair distance; it is mucoid and the capsular substance tends to take the stain. There are no indentations). Other streptococci do not usually have capsules; when they do, the capsule is very close to the organism, and has deep indentations between each of the cocci in the chains.

When the typical capsule of the pneumococcus (or *Streptococcus mucosus capsulatus*) is present, the identification can at once be made. If the organism has the streptococcus type capsule, or no capsule, it must be studied, for the organisms just mentioned may lose the type capsule after successive inoculations or under adverse circumstances.

To determine whether such an organism is a streptococcus or a pneumococcus one can use the inulin test and the precipitation test. Dr. Hiss (11) of New York, made the very valuable discovery that pneumococci ferment inulin and streptococci do not. He uses the inulin in his well-known serum-water mixture. The reaction is shown by acidification or coagulation of the medium. We found that all the pneumococci fermented inulin (12, 13)[7] and a very few streptococci.

As a control, we have used the precipitation test (15). Some years ago I noted that streptococci regularly precipitated (whitened) serum-glucose-agar within 48 hours and pneu-

[3] Wassermann in his article states that the medium should be very alkaline, using litmus as an indicator. I found the most advantageous titre was neutrality to phenolphthalein.

[4] There are some cases reported in which this organism is supposed to have caused a systemic infection (53). We have not encountered such a case.

[5] All the organisms recognized as streptococci precipitated serum-glucose-agar (see below):

[6] This organism will doubtless be soon identified in the blood-current, now that local infections produced by it are more often recognized.

[7] But not in all generations. Sometimes it was necessary to use Dr. Buerger's modification (14) (addition of peptone). All the organisms identified as pneumococci by the type capsule fermented inulin.

mococci very rarely did. Dr. Buerger (12) found that this held true in a large series of tests.[8]

We have, therefore, followed this scheme. If when the type capsule is absent the organism ferments inulin and does not precipitate, it is a pneumococcus, and vice versa it is a streptococcus. If it does both, animal inoculations should be made to try to restore the type capsule.[9]

The differentiation of the organisms by the characters of their growth in plates of blood-agar (16), though useful, cannot be entirely relied upon. I show you a plate made by Dr. Epstein from the blood of a case of pneumonia (17). Whereas the pneumococcus colonies are supposed not to be surrounded by clear areas (hemolysis) this pneumococcus not only produces a large clear ring, but at some distance away there is a second ring of hemolysis.[10] Otherwise the organism has the typical pneumococcus characteristics. The pneumococcus in the sputum caused no hemolysis.

We have had a specimen of a pneumococcus from the blood of a case of infection of the foot, which, when first isolated, had no capsule, grew in chains, fermented inulin and precipitated. After animal inoculation the organism was coccoid, often bacillary, and groups were found surrounded by single capsules. Later animal inoculations resulted in the production of the type pneumococcus capsule.

I cannot enter more fully into this question now, but have said enough to indicate the great care that is necessary in identifying these organisms.

The literature shows that not sufficient care has been taken in distinguishing staphylococci. Professor Welch (19), already in 1891, pointed out that the pigment of *Micrococcus aureus* often requires several days for its development and that potato is a favorable medium for its production. Glucose media, we have found, often temporarily cause a loss of the color. We are in the custom of inoculating all white staphylococci on agar, potato and serum-agar, leaving them in the thermostat for 24 hours, and then allowing them to stand outside in diffuse daylight for seven days. We have made no studies on the differentiation of staphylococci by means of hemolysis production or agglutination tests. (20) [11]

The Gram-negative cocci found in future will need careful study, and their exact status may, in some instances, remain in doubt (particularly if there is no meningitis or gonorrhea present), for we now know that there is a group of organisms closely allied to the gonococcus and meningococcus. (21) [12] It will not be enough to identify an organism as a gonococcus because it is Gram-negative and cannot be grown on media. It must be cultivated and studied. We have met with a Gram-negative contaminating diplococcus which was found to have been derived from the ascitic serum used. In another case we found in a post-mortem culture in a case of osteomyelitis (due to *Micrococcus aureus*) a Gram-negative organism which was neither the gonococcus nor the meningococcus.

The blood-cultures were usually observed for 5 to 7 days, hanging-drops from the flasks being made daily, as well as inoculations on serum media and into glucose-bouillon. The time in which the cultures became positive varied. The earliest two periods were six and eight hours. Often results were obtained in 12 to 16 hours; at times 48 hours or more elapsed. If the organism was a staphylococcus that was slow in its pigment production, 5 days might elapse before a definite report could be given, but this was very exceptional.

The number of organisms varied from one in 15 cc. up to 2676 to the cubic centimeter, or up to such a number that the colonies could not be counted. At times the growth was so marked that the separate colonies were indistinguishable and the medium looked simply discolored. The variation in the number of colonies in a given case will be discussed later.

In every instance in which the culture was positive we attempted to confirm the result by cultures made from the primary focus or secondary foci, or by means of later cultures of the blood, before or after death.

In only eight cases were we unable to obtain confirmatory cultures. Either there were no evident lesions, or cultures were not sent in from them when present. In some instances the patient died and a further culture could not be obtained. But in each of the eight instances the clinical picture was in accord. In seven, the diagnosis was acute endocarditis; the eighth was a terminal infection. All of the cases showed pneumococci or streptococci. All staphylococcus findings were confirmed.

Comparatively few cultures were taken just prior to death, because we were interested in the problems mainly from a diagnostic standpoint. Had more been taken we might have met with more positive findings; a greater variety of organisms might have been found.

We laid no stress on cultures made after death, except as a means of confirming those made during life. A little experience was sufficient to show how cautious we must be in interpreting post-mortem findings.[13] (Of course, the presence of such organisms as the anthrax or glanders bacillus is

[8] In my original experiments I used ½ per cent glucose medium. Dr. Buerger, through a suggestion of mine used 2 per cent. We have been using the ½ per cent medium for the last few months and find that it is more advantageous.

Only when a streptococcus grows so sparsely that there is little evident growth, is precipitation absent, so that a good growth without precipitation seems to exclude a streptococcus.

[9] *Streptococcus mucosus capsulatus* ferments inulin and does not precipitate.

[10] We have seen concentric (intermittent) hemolysis once before (18). The organism was a streptococcus.

[11] A possible influence of icteric serum will be discussed later.

[12] We encountered one such organism (in the pus in a case of otitis media) which produced a disagreeable odor in all media. And Dr. Boggs (22) has described one as occurring in bronchiectasis, which grew in blood only, and produced an odor.

[13] I shall not discuss the question of whether some positive post-mortem findings may not be due to agonal invasion and post-mortem multiplication.

diagnostic.) Whether cultures made from the arm veins would give more reliable results than the heart-blood, as Canon (23) and Gradwohl (24) claim, our experience is too small to permit us to state.

3. ORGANISMS FOUND: FREQUENCY: SHORT LIST OF CONDITIONS IN WHICH THEY WERE ISOLATED: MIXED AND SECONDARY INFECTIONS.

Before giving the facts of interest in this connection I want to state that I shall give no percentages as to the frequency of positive findings in various forms of diseases. Such figures are misleading, the results depending on the type of cases studied and the stage of the disease at which they were studied. This will be made more evident by the general remarks on negative blood-cultures.

The organisms found were: streptococci, the pneumococcus, *Micrococcus aureus*, *Micrococcus citreus*, *Micrococcus albus*, *Bacillus pyocyaneus*, paracolon bacillus, *Bacillus coli*, *Bacillus proteus vulgaris* and the gonococcus.

Streptococci were isolated in 58 cases. Some were instances of terminal infections, or infections arising from the tonsils, the ears and mastoid processes, or the genito-urinary tract. In some cases there were infected wounds; in others the source of infection could not be found. Some were characterized by joint or bone lesions. Endocarditis was frequent. One was a case of erythema nodosum. In one case the source of infection was an abscess at the root of the lung secondary to esophageal carcinoma; in another it was a suppurating tabetic joint of the great toe. In one case there resulted a hemorrhagic myositis of both forearms. Metastatic bone lesions were not uncommon; once there resulted an extensive osteomyelitis of the vertebral column.

Micrococcus aureus was found 28 times (25). Many of the cases were instances of osteomyelitis; some were secondary to furuncles or cellulitis; some were cryptogenetic bacteriemias. Two were post-partum infections; bacteriemia due to staphylococci is rare under such conditions.

In a number of cases endocarditis was present. In one case a cystitis was the primary focus, and in two cases abscesses of the prostate occurred secondarily. Of particular interest were two cases with metastases in the muscles and one with a small abscess of the sclera.

The only staphylococcus albus findings confirmed by subsequent cultures were made (with one exception to be discussed later) within two days ante-mortem and were confirmed by heart-cultures. These were looked upon as agonal invasions. We have not met with a single case in which the finding of the albus in the blood was followed by the establishment of a metastatic depot. On the whole we look upon the organism as playing little role in systemic infections. This is in keeping with the infrequency of our finding it in local lesions of any importance, a point long ago emphasized by Professor Welch (19).

There are two observations in this connection which I wish to mention. One refers to a case of acute endocarditis of the aortic valve with an inflammatory swelling in the septum. The staphylococcus albus was cultivated in the blood 12 and 10 days ante-mortem, and also at the autopsy. The spreads made from the swelling in the septum showed many staphylococci. Although there is no doubt of the validity of the cultures, the organisms at the time were not observed as we now observe them, and, therefore, we cannot exclude the possibility that we were dealing with a staphylococcus aureus.

The other observation was made in the case of an infant two weeks old, suffering from hemorrhages of the new-born with jaundice and fever, supposedly due to an infection. The blood which we were fortunate enough to obtain from a vein in front of the ankle showed *Micrococcus albus*. A culture made 40 hours post-mortem showed a pure aureus in the first colonies. As I had never observed a *Micrococcus albus* invasion followed by one by the aureus, I suspected that the icterus may have temporarily inhibited the pigment production.

A short time later a specimen of bile from a case of cholecystitis was sent to us. The first culture showed an albus that could not be changed to an aureus. A culture made the next day showed an albus that became aureus after 3 days; the third culture gave an aureus in two days, and all subsequent cultures showed the aureus at once.

We made a few experiments trying to prove that bile might temporarily inhibit the pigment production, but were unsuccessful. We hope to repeat the experiments with icteric serum (or bile from inflamed gall-bladders), because it is known that they act differently from normal bile itself. This is shown by the work on the agglutination of typhoid bacilli by icteric serum. Whereas icteric serum has more or less agglutinating power, bile itself has practically none (26).

For the present, *Micrococcus albus* found in a case with icterus should be particularly studied, and carefully considered.

Pneumococci, apart from pneumonia cases, were found 4 times. Twice there was an acute endocarditis,[*] source unknown. Once there was an infection between two toes, and once there was a suppurative ethmoiditis and frontal sinusitis with brain abscess.

Micrococcus citreus was isolated once in a case of osteomyelitis; the bone showed the same organism. The patient recovered.

Bacillus pyocyaneus was found once (in a case published by Dr. Brill and myself) (27) secondary to *Micrococcus aureus* bacteriemia. The case was fatal.

A paracolon bacillus was isolated once in a case clinically resembling cholecystitis (published in extenso by Dr. A. A. Berg and myself) (28).

The gonococcus was believed to have been found once, ante-mortem, with a streptococcus, in a case of post-abortive infection. The Gram negative coccus could, however, not be further cultivated, and to-day I would not be willing to say that

[*] In one of these two cases, in the service of Dr. Alfred Meyer, there was an embolism of the abdominal aorta.

it was definitely a gonococcus (see above under Technical Considerations).[15]

Bacillus proteus was found by Dr. J. Gerster one day antemortem with streptococci in a case of uremia.[16] *Bacillus coli* was found in the blood of a patient upon whom the operation of internal urethrotomy had been performed. The case was fatal.

In a case of infection of the gall-bladder by the gas bacillus (Welch) an attempt was made to cultivate the organism from the blood. Cultures were made and also direct animal inoculations, but the result was negative. The organism has been found several times in the blood by other observers.

Mixed and secondary infections were uncommon. All such cases were fatal. Those encountered were:

(a) A streptococcus with a possible gonococcus.

(b) A streptococcus and the proteus bacterium.

(c) In the paracolon case, a culture made one day antemortem showed also streptococci and *micrococcus albus*. This was confirmed at the autopsy.

(d) In a child dying of an umbilical infection, a streptococcus was found with *Micrococcus aureus*.

(e) A pyocyaneus infection secondary to one by the aureus.

(f) In a case recently under the observation of Dr. Rudisch and Dr. Sachs, with the clinical picture of a hemichorea, *Micrococcus aureus* was found; the second culture showed mainly the same but also a streptococcus; in the third culture the streptococcus predominated. The post-mortem cultures showed no aureus in the blood. This was a striking example of a secondary infection crowding out the primary.[17]

When a primary focus shows two or more organisms, the blood sometimes shows only one. Recently, in a case of phlegmon of the arm, due to a streptococcus and the *Micrococcus aureus*, only the former was found in the blood.

4. Notes on the Findings in Some Surgical Conditions.

In most of the cases of acute osteomyelitis,[18] particularly those due to the *Micrococcus aureus*, organisms were found in the blood. There is a peculiar difference between the cases due to staphylococci and those due to streptococci. In the staphylococcus cases the bone disease is apt to stand out in the clinical picture, whereas in the streptococcus cases we look upon it more often as the result of a bacteriemia. Of course, we know that all the osteomyelitic lesions are secondary, due to a recent invasion by bacteria or old deposit. But the staphylococcus bone lesion once established seems to cause a more marked bacteriemia than the streptococcus cases.

Most of the acute staphylococcus cases occurred in children. As Jordan (29) well says, "Osteomyelitis is the septicemia of adolescence." That is to say, in children bacterial invasion of the blood is apt to set up bone lesions because the growing bones are points of diminished resistance. In adults metastatic bone infections are less common.

In some of the staphylococcus bone infections in children, when the bacteriemia was marked, interesting cutaneous lesions were found. These consisted of pustules in the scalp and slightly purulent miliaria or pustules scattered over the entire body or part of the body. The lesion usually first appeared on the scalp or over the shins. The lesions, including the miliaria, all gave cultures of the *Micrococcus aureus* (ordinary miliaria alba show the *Micrococcus epidermidis albus*.) All the cases in which these lesions were found were fatal. Skin lesions have been often described in cases of bacterial infections, but I do not know that attention has been called particularly to the scalp lesions. I believe the lesions which I have described are due to infections of sweat glands. The question of whether this is due to an attempt at elimination is left open.[19]

The few cases of osteomyelitis of the jaw which were studied showed no bacteriemia even when accompanied by cavernous sinus thrombosis.

A remarkable case was that of a man who died of a fulminating osteomyelitis of the femur after he had suffered for eight years from recurrent staphylococcic bone and joint infections (31). The original infection followed an operation for the relief of hemorrhoids. On the day before death no bacteria were found in the blood. It would look as if the blood had developed marked bacterial power, and as if the infection of the femur were due to cocci deposited long before. This was the only case of severe staphylococcus osteomyelitis, in which bacteria were not found in the blood.

In many cases of secondary parotitis no bacteria were present in the blood. In only one case of streptococcemia did we find a streptococcus infection of the parotid. In other cases of local or general streptococcus infection, or intra-abdominal infections, a secondary parotitis was due to the *Micrococcus aureus*. These observations strengthen the view that most cases of secondary parotitis are not metastatic infections, but are mouth infections (32).

In intra-abdominal infections the results were quite unexpected. I shall cite a few. In cholecystitis the results were negative. Even in some cases with secondary pulmonary metastatic infections there was no bacteriemia.[20]

In a series of 25 cases of appendicitis, the results were negative, even anærobically. Here also in some very severe cases the ante-mortem cultures were negative (in a few, the post-mortem also). Occasionally systemic infection must occur, as shown by a case with a negative blood-culture which died a few weeks later and showed an acute endocarditis and

[15] Post-mortem the gonococcus was found twice. (See under "Endocarditis.")

[16] I am indebted to Dr. Goldenberg for this case.

[17] This case was studied by Dr. Epstein and Dr. A. Cohn.

[18] These cases occurred in the services of Dr. A. Gerster and Dr. Lilienthal.

[19] Werther (30) describes a case of streptococcus osteomyelitis with papules in the skin having a central vesicle; in one excised lesion he found a necrotic inflammation of a sweat gland.

[20] In making blood cultures in cases of cholecystitis, the methods should be adapted to the finding of the typhoid bacillus, as the latter occurs fairly often in cholecystitis.

purulent infarcts in the kidney. A later culture would probably have been positive.

In one of the series of cases there was a chronic endocarditis with erythema nodosum. In another, the pus showed *B. proteus fluorescens*, the cause of certain cases of acute toxic febrile icterus (33)—(so-called Weil's disease).[21]

In about 25 cases of peritonitis (mainly of intestinal origin), the blood was sterile; in some just before death. In the series are a few of the cases of streptococcus and pneumococcus peritonitis occurring in the course of chronic parenchymatous nephritis. These cases have a peculiar clinical picture which I hope to describe at a later time. Bertelsmann (34) has also had negative results in peritonitis.

In 7 cases of pylephlebitis[22] and 3 supposed cases (no autopsy in 2, recovery[23] in one) most of which were suppurative, the results were negative. There are positive cases in the literature. I have not yet gone over all of them to see in how many cases cultures were made early in the disease (35) (36).

In infections arising from the female pelvic organs[24] (especially after abortion or delivery at term) the findings were of particular interest. The organisms found were streptococci and the *Micrococcus aureus*. (The latter occurred twice; such cases are rare). There was quite a large number of positive results. But in some of the cases with extensive thrombosis in the veins, with or without parametritis, the blood-cultures remained sterile. In one of these cases the cava was completely thrombosed; in another there was parietal purulent thrombosis of the cava with metastatic abscesses of the lungs and pyopneumothorax. In a third case, there was an abscess of the clitoris, with abscess in the broad ligament due to thrombo-phlebitis and pulmonary abscesses. In a fourth there was a parametritic abscess with thrombosis of the cava and metastatic abscesses of the lung, all the lesions showing streptococci, a pseudo-tubercle bacillus and some other organisms.

In infections of otitic origin[25] there were similar results. There were severe cases without bacteriemia. There were cases with bacteriemia and recovery. At times the disappearance of the bacteriemia was due to operation on the sinus or jugular vein. And there were cases of sinus thrombosis with secondary pulmonary lesions without bacteriemia. In all the cases a streptococcus was found.

In bladder and kidney infections there were few instances of systemic infection (the material studied was small). In one fatal case of suppurative thrombosis of the iliac vein after urethrotomy, the first culture was positive and the later one negative. The organisms found were the streptococcus, *Micrococcus aureus* and *B. coli*. In these organs, metastatic lesions were common.

NOTE.—The frequency of negative results in the types of intra-abdominal disease discussed are particularly interesting when one remembers that the causative organisms are, except for the anaërobes, capable of easy cultivation. I would like to repeat that if more cultures had been made within a few days before death, there might have been more positive results. Clinically, the results are in harmony.

5. NOTES ON FINDINGS IN CERTAIN MEDICAL CONDITIONS.

I should now like to direct your attention to the results obtained in some selected types of disease usually regarded as belonging to the domain of internal medicine. In some of the conditions which I shall mention there is no evidence that they need be associated with a bacteriemia. Positive results have been obtained in some of the diseases grouped here by other writers.

In several cases of pseudo-leukemia the results were negative, even when the temperature was of the intermittent type described by Ebstein.

In tuberculosis we met with no secondary systemic infections.

In two cases of multiple obliterating endophlebitis (one fatal),[26] two cases of acute ascending paralysis (Landry's) and in one of febrile neuro-myositis, there were also negative results.

In the group of cases described by Dr. Brill (37), which resemble typhoid fever somewhat, and which have been considered to have been possibly cases of paratyphoid fever, we could not succeed in isolating any organisms from the blood. There is no proof yet that they are cases of paratyphoid, and should, therefore, be classed for the present as a separate group.

Of a large number of cases of acute leukemia, cultures were made in six. All gave negative results except two in which there was an agonal invasion by *Micrococcus albus*. A positive finding in a case of acute leukemia would have to be carefully analyzed. Besides the possibility of a terminal infection there might be a bacteriemia arising from one of the infections often found in these cases (particularly about the mouth). Apart from this I can imagine that a case might arise in which it would appear probable that the disease was due to a bacterial infection. For, a study of a large number of cases certainly gives one the impression that the disease is due to changes in the blood-forming organs (particularly the marrow) which could be due to a variety of causes, just as has long ago been found to be the case with pseudo-leukemia infantum. In children, in infections, one occasionally meets with blood-pictures that resemble those found in some cases of acute leukemia.

In cases of "visceral lesions of the erythema group" (Osler) (38) and in various forms of purpura, the results were nega-

[21] We had no opportunity of investigating any case in which the appendicitis appeared to be the result of a systemic infection.

[22] Included among surgical conditions because most often occurring in connection with surgical diseases.

[23] For the privilege of investigating this private case I am indebted to Dr. Manges.

[24] These cases were in the services of Dr. Brettauer and Dr. Krug.

[25] In Dr. Gruening's service.

[26] In these cases anaërobic cultures were also used.

tive. In a series of remarkable cases of erythematous lesions with fever, lasting a number of weeks, with secondary renal or pulmonary lesions, there were negative results, except in one. This was a case in Dr. Brill's service of erythema multiforme (particularly erythema nodosum) with joint inflammations and high fever running several weeks, and ending in recovery with stiff joints. In one culture out of five a few colonies of an attenuated streptococcus were found, possessed of feeble pathogenic power (transient joint symptoms in rabbits). This shows the necessity of repeated cultures in such types of disease.

Of five fatal cases of acute degeneration of the liver (acute yellow atrophy) cultures were made in two, with negative results.[27]

In rheumatism, arthritis deformans and gonorrheal rheumatism, no bacteria were found in the blood. (In two cases of rheumatism the fluid aspirated from the joints showed no bacteria. These cells were mainly polynuclear).

NOTE.—In this section we have discussed a number of medical diseases, most of which are probably due to different causes in different cases. Dr. Epstein, will, I hope, later report in cases of typhoid fever, pneumonia and meningitis.

6. ENDOCARDITIS: EMBOLIC ANEURISMS.

The most interesting condition connected with the subject of bacteriemias is endocarditis (39). The study of these cases by means of blood-cultures makes very definite Leube's (40) view that the acute endocarditis in these cases is a secondary infection. As is well known, such a bacteriemia may affect normal valves, but more often diseased valves (41). A primary focus may or may not be evident. Some of the cases are examples of terminal infections.

There is often a marked disproportion between the number of bacteria in the blood and the extent of the lesion. There may be an almost countless number of bacteria in the blood and only very small deposits on the valves, or there may be large vegetations with hardly any bacteria in the blood. As a rule, they are present in fair numbers.

Again, in a case of chronic endocarditis there may be a marked bacteriemia and at the autopsy we may find only a little deposit of fibrin on the wall of the heart or no lesion whatsoever. I show you some hearts to illustrate this. One is of particular interest. The patient, who was admitted into Dr. Brettauer's service because of a post-partum infection, had a marked bacteriemia, heart-murmurs and all the symptoms of so-called "ulcerative endocarditis" (petechiæ, high temperatures, chills, etc.). And still, as you see, the heart shows only an old mitral stenosis and no recent lesion. The case was one of bacteriemia in a patient with chronic endocarditis. There is no reason why such a case (with a less marked bacteriemia) should not get well. It might then wrongly go on record as an "ulcerative endocarditis" with recovery.

[27] I believe that it would be better to include in this group only cases for which no cause is found.

I believe it is best to call all the cases, acute, subacute or chronic endocarditis, according to the clinical course, then attach the name of the infecting organism when it is found (thus, "acute streptococcus endocarditis"), and attach an adjective—vegetative, polypoid, ulcerative, etc., descriptive of the type of lesion, when it is seen. The hearts which I demonstrate to you to-night show how difficult it often is to diagnose beforehand the type of lesion.

The organisms found by us in these cases have been streptococci, pneumococci, *Micrococcus aureus* and gonococcus.

Of the last there were two cases. In the first, the cultures were made when we started the work and favorable media were not used. The result was negative, the gonococci being found post-mortem. The second case was diagnosed post-mortem: no cultures were requested during life. In a third case of endocarditis following gonorrhea, streptococci were found in the blood during life and at the autopsy. When the patient entered the hospital there were no longer gonococci in the urine, but there were streptococci.[28]

In some of the cases of endocarditis the number of bacteria varied from time to time. In some, they increased up to the time of death; in one, they decreased. There seem to be two types of cases: one in which a bacteriemia which in itself would not necessarily be fatal, sets up an endocarditis which keeps up the bacteriemia and dominates the clinical picture. In the second type the original bacteriemia plays the main role.

In some cases of acute endocarditis with marked lesions we have looked for and found acute enlargement of the nodes at the bifurcation of the trachea. In cases in which there were no acute pulmonary lesions present we have attributed the enlargement to the endocardial lesions, as the lymphatics which drain the heart enter these nodes (intertracheo-bronchial group of Poirier) (42). I might mention here that in cases of marked bacteriemia one finds at times the lymph-nodes all over the body somewhat enlarged, pink or red in color.

In two cases of acute staphylococcus endocarditis with marked cerebral symptoms, the cerebro-spinal fluid presented interesting changes. In both, leucocytes and cocci were present, the latter being mainly intra-cellular. In one of the cases the cocci were numerous but it was very difficult to cultivate them. The cultures from the blood gave profuse growths (2,200 colonies to the c.c.).[29] There was but slight increase in the leucocytes.

There are many cases of chronic endocarditis with fever without any demonstrable bacteriemia. In some cases causes for the fever may be found elsewhere in the body. If no cause can be found, the acute symptoms may be due, at least

[28] Since writing the above we have encountered two cases of general gonococcus infection, one with negative result and one with two positive cultures. At the autopsy in the former, the gonococci were found in an abscess of the mitral valve. The surrounding thrombus mass showed no gonococci.

[29] A study of the relative opsonic contents of the blood and cerebro-spinal fluids in such cases might give results of interest.

at times, to organisms not to be cultivated by our present methods. I have suspected that in some cases with irregular fever, at times quite high, recurring from time to time, the temperature may be due to discharge into the blood-current of bits of thrombotic masses or old vegetations (43).

There is another group of febrile cases lasting a number of weeks or months, in which bacteria are repeatedly demonstrable in the blood (44). In such cases we have never found staphylococci but always attenuated streptococci or diplococci. In some cases the organisms are fairly abundant; in some very sparse. In one case, a week before death, they were very numerous and grew on serum-glucose-agar plates only. Later they grew on other media but were kept alive with great difficulty. In one case we found only two colonies in 25 cc. of blood. In five instances they were short, small streptococci and in three a lancet-shaped diplococcus which did not appear to be a pneumococcus.[20] The last case in which the diplococcus was found occurred during the past year, and we made a careful study which showed that the organism had no capsule, did not ferment inulin and did precipitate serum-glucose-agar. It was, therefore, definitely not a pneumococcus.

Several of the organisms correspond to those described by Lenhartz (39) and Schottmueller (45), but the others seemed to be even more attenuated (they grew at first only on serum-glucose-agar or the Wassermann medium). I wish I could give an accurate differential description of these organisms from ordinary streptococci by means of their fermentative reactions (in carbo-hydrates) but careful studies made by Dr. Buerger (to be published soon) show that it is not wise at present to depend upon differentiation by such means. The organisms were hardly pathogenic—at most they would produce peritonitis in mice, and then at times by repeated transfers only. Direct inoculations of blood into mice, rabbits, and guinea-pigs were tried in two cases with negative results.

In all these cases there was a history of joint manifestations at the apparent onset of the symptoms or months or years previously. In all which we could examine post-mortem, there was present an old, chronic endocarditis on which recent lesions were grafted. I show you hearts from four such cases. You will notice that the vegetations are very friable (in one less so), and in each instance there is a mural endocarditis of the left auricle (in one also of the anterior flap of the mitral and the wall of the left ventricle over the septum membranaceum).

Some of these patients are able to walk about the wards although there are cocci in the blood. But although the symptoms are generally mild, and though the temperature may be quite low for a long time, it may rise sharply from time to time, and toward the end of the disease there may be chills and high temperatures.

All of the cases of this type which we could follow were fatal. One of them left our hospital feeling quite well after an illness lasting some months, and died four months later at another hospital. Streptococci had been found three times in her blood.

One patient who was in Dr. Manges' service developed an aneurism in the right popliteal artery with subsequent thrombosis in the sac. He left the hospital after a prolonged stay; the subsequent history is unknown. Lenhartz describes two recoveries but does not state how long the cases were observed. What the portal of entry in these cases was, I do not know. It may have been the tonsils. The possibility of acute exacerbations due to bacteria which have remained dormant and become attenuated in old endocardial lesions, must be thought of (analogous to what is known to occur in osteo-myelitis).

At this time I do not wish to discuss in detail the question of the etiology of rheumatism (46), but will say that I believe it would be wiser for the present to call all these cases subacute or chronic streptococcus or diplococcus endocarditis, and not to call them rheumatic endocarditis because of the rheumatic history. According to the terminology that I would suggest, cases of endocarditis occurring in what we call rheumatism should be called acute, subacute, or chronic endocarditis, and the fact that no organism was indicated in the name would at once show that the cause of the endocarditis in the particular case had not been found.

I have indicated the importance and frequency of acute and subacute endocarditis associated with bacteriemia, and, without attempting to discuss the diagnosis of such conditions, I would like to refer to a point which has been of great value. It is well known that petechiæ occur in these cases. The particular value of the occurrence of conjunctival petechiæ and "the small hemorrhages in the palms and soles with slightly nodular character" I learned from Dr. Janeway when I had the privilege of serving under him.[21] Very occasionally conjunctival petechiæ are found in cases of chronic endocarditis in which no bacteria are demonstrable in the blood, and occasionally they occur when there is a bacteriemia without any acute endocarditis. Further, in some of the cases of acute endocarditis with bacteriemia the petechiæ may appear late or not at all. Nevertheless, a sharp lookout for them will often direct attention to an acute endocarditis to which there was no other clue.[22]

One of the most striking features of some cases of endocarditis is the establishment of aneurisms. We have seen five cases (48). In two no cultures could be obtained during life; in one, streptococci were found post-mortem, and in the other streptococci and *Micrococcus aureus*. Twice the lesion occurred in the cases in which streptococci had been repeatedly found in the blood. In one, streptococci were found in the walls of the aneurisms (of the hepatic, mesenteric, and a branch of the femoral arteries) post-mortem. The other case

[20] I am indebted to Dr. A. Mayer and Dr. H. Herman, of New York, for the privilege of investigating two of these cases.

[21] The observation was later published by Dr. Janeway (47).

[22] I have, of course, made no attempt to discuss causes of conjunctival petechiæ other than endocarditis and bacteriemia.

was the patient with the aneurisms of the popliteal artery mentioned above.

In a fifth case, recently observed in Dr. Rudisch's service, there developed embolic aneurisms of the left iliac artery and a branch of the renal artery. Repeated blood-cultures were negative. At the autopsy there were none of the usual lesions of acute endocarditis, but there was a large mass of calcareous vegetations, and a piece of lime was found in the aneurism of the iliac artery. (There was also an aneurism of the mitral valve). This case shows that it is probable that embolic aneurisms are not always bacterial in nature.

In some cases of acute bacterial endocarditis one finds occasionally a small, tender swelling on a superficial vessel, which persists or disappears. I have not been able to determine yet whether these may be very small aneurisms or inflammatory deposits.

7. Remarks on Negative Blood-Cultures.

It is necessary to discuss, even if briefly, the significance of negative and positive results, particularly with reference to the cases of infection by the ordinary pyogenic cocci. The first and most important question is, do bacteria enter the blood-current in every case of local infection? This question is a difficult one to answer because we cannot examine the blood every day for bacteria. We can obtain a general idea, however, from the results in a large series of cases. And from these we cannot deny the possibility that in every case of local infection bacteria may enter the blood-current at one time or another. Even very small foci may be the starting-point of a bacteriemia. How often all the bacteria which enter the blood are gotten rid of by the bacterial powers [23] of the body and can, therefore, not be cultivated, even on optimum media, one can only surmise. Practically these are cases without bacteriemia.

From a study of all the cases in our series, I am inclined to the following beliefs as to negative findings: [24]

1. The case may not be one of infection by one of the ordinary bacteria. It may be a case of tuberculosis, actinomycosis or syphilis; it may be due to an infection by protozoa; it may be due to parasites of any kind which have not been isolated.

2. The case is due to one of the ordinary organisms, but there are no bacteria in the blood-current. This may occur in any type of infection. I have indicated how it can occur, at least at times, in certain cases of intra-abdominal infections, and in cases with even extensive thromboses of the cerebral sinuses, or of the intra-abdominal veins with or without secondary foci in the liver or lungs. For such cases as the last I am in the habit of using the term incomplete or partial bacteriemia. (In all these cases the bacteria are, of course, usually carried into the liver or lungs by pieces of thrombi).[25] When the diagnosis is not made this is a cryptic bacteriemia. The cases involving the portal system can be called portal bacteriemias.

3. Bacteria may have been present in the blood and have disappeared from it with or without the disappearance of the primary focus and with or without the establishment of secondary foci. They may, of course, remain after metastatic foci are established. We have never seen them disappear completely when the endocardium was involved.

4. In the cases in which we can take for granted that a secondary (and possibly a fatal focus) is established by the passage through the blood of a bit of infected clot, it is easy to see how there need be no bacteria demonstrable in the blood (example: A brain abscess due to embolism from a thrombosed branch of the pulmonary vein in empyema). At times without evident thrombosis a secondary focus is set up by a very short invasion of the blood-stream (para-nephritic abscess due to a small focus in the kidney after a furuncle of the face).

The last two types of formation of metastases are sometimes called infection by transport (50).

8. Remarks on Positive Blood-Cultures.

Concerning positive results I wish to make the following remarks: I group the cases of infection into two groups: A. With a primary focus of some extent. B. With a minute (e. g. a small furuncle) or no demonstrable primary focus.

I shall refer to endocarditis separately from other metastatic foci, for reasons which will be very evident from my remarks.

A. 1. If the bacteria are present in the blood and the primary infection is successfully treated, the bacteria in the blood may slowly or rapidly disappear. At times one finds what one may consider the end of the bacteriemia (e. g. one colony of pneumococci in 12 c. c. of blood in a case of infection of the foot, when the patient was apparently recovering). Occasionally the bacteria disappear from the blood even though the primary focus is not eradicated.

2. Whether the primary focus has been successfully treated or not, the bacteria may remain in the blood, metastatic foci may or may not develop, the endocardium may or may not be involved. If the primary focus has healed and no endocarditis has resulted and no metastatic infections, we can presume that the bacteria have multiplied. Whether they mul-

[23] As you are aware, it is not definitely settled how large a role the bactericidal power of the blood plays; some believe other agencies play a much greater role in ridding the body of bacteria. When I use the term "bactericidal power," I use it to indicate briefly all the defensive powers of the body.

[24] The remarks on negative and positive blood-cultures are made on the basis of clinical observation, the blood-cultures and the post-mortem examinations.

[25] I believe, although I have had no proof of such a condition, that it is possible that blood-cultures might at times be negative when metastatic foci were set up in the lungs by way of the thoracic duct. Dr. MacCallum (49) has drawn attention to processes in the lung set up by emboli of cells by way of the thoracic duct in typhoid fever. In a personal interview he has told me that he believes that in agreement with what I had suspected bacteria are carried along with the cells and are responsible for many of the local phenomena.

tiply in the large vessels or only in the capillaries, or, as some maintain, in the endothelium of certain organs, it is not necessary to discuss now.

3. When secondary foci develop (excepting endocarditis) the bacteria may not persist in the blood-current (as mentioned under "negative results.")

4. There is a possibility that bacteriemia may result from surgical intervention or an infected focus, when much manipulation has to be done or from extensive handling during dressings. We have seen a possible instance of the former and Mœller describes an example of the latter. Both cases recovered. How often such a bacteriemia might be harmful future studies may show. Such studies would have to include cultures before and after operations, and would have to be very carefully interpreted.[26]

B. When the original focus is very small or none can be found and there is a bacteriemia, conditions are the same as discussed under heading A-2.

If an acute endocarditis develops the number of bacteria found may be small or large. If there is no endocarditis and no other secondary foci, the number is large.

In general it seems that the bacteriemia is often due mainly to the invasion of bacteria from a local focus, and many organisms may be found in the blood under such conditions. In one case of osteomyelitis of the humerus there were found 500 colonies of *Micrococcus aureus* to the cubic centimeter of blood. A blood-culture made four days after operation was sterile, the patient recovering.

Multiplication of the bacteria is probably not as common as it was supposed to be, and it is only when there are large numbers present without the presence of a focus from which they could be discharged, that we can presume that they have multiplied.

It is very tempting to enter into a discussion of the problems concerning the elimination of the bacteria from the body (by the bile, sweat, milk, and urine). Much has been written concerning the question whether the presence of the bacteria in the urine is due to an active eliminative process or whether it is simply an accident due to the fact that the lesions set up by the bacteria and their poisons make the renal filter less perfect. It would exceed the limits of this paper to discuss this problem alone (51). But I would like to draw attention to a few of our findings in the urine of the cases with bacteriemia. The difficulties in this work, and points to be regarded for a careful interpretation of the findings I shall not now detail.

When the bacteria were present in fairly large numbers in the blood they were usually found in the urine, and in cases in which they disappeared from the blood, the bacteria in the urine disappeared first. In a couple of cases, however, they persisted in the urine after none were demonstrable in the blood. In one such case we found metastatic abscesses in the kidneys. Whether the bladder lesions found in seven cases of invasion of the blood by streptococci or staphylococci cause a persistent bacteriemia, I do not know. (In all cases in which marked secondary bladder lesions were present at autopsy, the bacteriemia had persisted.)

10. Diagnostic Considerations.

Much might be said in a tentative way concerning the diagnostic uses of blood-cultures, but I shall refer to a few points only, basing my remarks on some of the observations embodied in the paper.

1. In some cases a blood-culture is the only means of recognizing that the patient is suffering from a bacterial infection. This is so well known that it need not be further referred to. It is important to remember, however, that the bacteriemia which is found may be secondary to a previous local or general infection by another organism (e. g. secondary bacteriemia), or it may represent an intercurrent or terminal bacteriemia in some non-bacterial disease. As an example of the former I might mention a case with streptococci in the blood in whom a subphrenic abscess was diagnosed. The autopsy showed that the original disease was typhoid fever, with splenic infarction.

2. The fact that bacteria are not demonstrable in the blood-current in some cases of pylephlebitis may be made use of in a diagnostic way. In some cases of this condition when there is no evidence of a primary focus, it is necessary to differentiate it from acute endocarditis. In the cases of acute endocarditis which would be simulated, however, we have always found bacteria in the blood if two cultures were made (very rarely were two cultures necessary). A year ago we made use of this point in a case in which we suspected the existence of a suppurative thrombosis of the splenic and portal veins. Two negative blood-cultures spoke against an acute endocarditis. The autopsy corroborated the diagnosis.

3. Similarly, negative results may be of use in the differential diagnosis between endocarditis and thromboses of the pelvic veins or vena cava due to infection through the genito-urinary tract (especially post-partum infections). In some of these cases, even when the inferior cava is partially or entirely closed, there are no local symptoms, not even edema of the legs or distension of the veins.[27]

The main point to be emphasized is that in fevers of obscure origin, especially if the temperature be intermittent and there are chills, and the blood cultures are negative, one must keep in mind the possibility of the existence of venous thromboses acting as a form of cryptic focus.

4. In two cases of sinus thrombosis of otitic origin, the

[26] If the Bier treatment of acute local infections by hyperemia should continue to be as favorably looked upon as it is now, it would be a great advantage from the standpoint under discussion. Canon has also drawn attention to this in his book.

[27] Professor Welch (52) states that this may be due to the fact that the deep veins dilate. We had come to the same conclusion as we often observed that in cases of severe bacterial infection there was a collapse of the superficial veins all over the body; at times this was so marked that it was impossible to obtain any blood when it was attempted to make a culture.

finding of some streptococci in the blood induced the surgeon (Dr. Gruening) to operate, although the local signs were apparently insufficient to account for all the symptoms. In both cases extensive thromboses were found; both patients recovered.[35]

In the one case the clinical picture looked like typhoid; in the other like malaria. The local signs were such that it was possible that the patients were suffering from the otitic disease plus the other conditions, but the finding of streptococci in the blood was considered to signify that the local disease could be the cause of all the symptoms.

5. When a local infection has been operated upon and the symptoms persist for a number of days, and there is a bacteriemia, the primary focus should be carefully examined. If it is in good condition careful search should be made for metastases so that they can be attended to promptly. Only if an acute endocarditis develops, or if the bacteria are present in large numbers, should one be satisfied with not finding metastases. In some infections there may be a secondary purulent phlebitis which gives no local symptoms. This is one of the difficulties. At times it is difficult to diagnosticate metastases in the internal organs (especially the lungs, kidneys, and spleen).

6. If the primary focus is healed or healing and there is no bacteriemia and the symptoms persist, metastases must be carefully looked for. (In the case of a colleague who had had a cellulitis of the arm, which had been incised, but in whom the fever persisted, the diagnosis of "sepsis" and "pleurisy" had been made, but the blood-culture being negative a careful search was instituted. A paranephritic abscess was located after a few days. An operation upon this focus was followed by recovery).

The metastases may be very difficult to locate, as mentioned above. In one case, there were found multiple abscesses of the kidney due to *Micrococcus aureus;* the blood-culture had been negative and there were no local symptoms. I believe that careful studies of the urine may in the future help us to locate such lesions. The data which we have thus far collected on this point are insufficient for publication.

7. Under the same conditions as described under heading 6, the symptoms may be due to the onset of some other condition. (Example: A child with empyema; local focus apparently doing well; fever re-appears; blood-culture negative; condition proves to be tubercular meningitis).

The conditions that hold good (under heading 6) when no bacteriemia is evident could also be stated to hold true when very few bacteria are found, except that in a few cases endocarditis may occur with only a few bacteria in the blood.

It becomes clear that although blood-cultures are of great service, they do not lessen the necessity for careful clinical observation, diagnosis and judgment.

[35] The bacteriemia disappeared shortly after operation. The jugular vein was tied in only one. A third case has recently been observed.

10. Prognosis.

What is the prognosis in the cases in which a bacteriemia can be demonstrated?

To consider this question fully would necessitate entering into a discussion of the problems concerning how the bacteria are disposed of in the body—problems which have not yet been definitely solved, and the exposition of which it is best to leave to others better equipped for the purpose. But we can say this much—that we must allow that even a moderate number of bacteria in the blood does harm by the demands made upon the protective agencies of the body and by means of the toxins liberated by the bacteria (before and after destruction) and that the character and location of the primary focus and the secondary foci play a great role in the prognosis.

Acute endocarditis plays a very important role. In all the cases in which we have made the clinical diagnosis, the case has been fatal. Others have reported recoveries. And it cannot be stated how often the valves of the heart are implicated in such a way that the lesion is not recognized (and how often such a lesion could become the origin of chronic disease).

In our series of cases the results have been as follows: In 58 cases of streptococcemia, there were 6 recoveries, or almost 11 per cent. Of 28 cases of staphylococcemia, 8 recovered, or nearly 29 per cent. Taking both sets together we have 86 cases with 16 per cent recoveries. (Of pneumococcus cases there were 4 with one recovery; the cases are too few in number to be included in the calculations).

The lower percentage of recoveries in the streptococcus cases does not necessarily mean that they are the more serious, for our observations cover medical as well as surgical cases; they therefore, include many cases of terminal infections and of endocarditis.

Bertelsmann, who studied surgical cases only, found 48 instances of bacteriemia in 154 cases; 21 cases recovered or 43 per cent. Of 28 streptococcus cases, 19 recovered, or 68 per cent; and of 13 staphylococcus aureus cases 4, or 30 per cent.

Lenhartz, who studied mainly medical cases (there were included a number of cases of post-partum infections) found 17 per cent recoveries in 77 cases. Of 47 streptococcus cases, 8 recovered or 17 per cent; and of 13 staphylococcus cases, one recovered (7½ per cent).

Canon reports 38 cases of bacteriemia with 5 recoveries (13 per cent).

While I do not think the number in any of the series is large enough, and while I do not believe in comparing the results obtained by different investigators in work of this kind, I think we can draw two conclusions:

1. That the number of recoveries reported depends to a great extent on the type of cases studied.

2. That the bacteriemia met with often does not prevent a favorable outcome.

CONCLUDING NOTES.

The statements which I have made, especially regarding the significance of negative and positive results, I present to you as theses. It is not possible for any one investigator to establish in a reasonable period their validity. They embody our experience up to the present time and we shall be glad to publish any observations that may be contradictory.

There are many points on which I might have touched, especially of a more direct therapeutic nature, which might have been of greater interest than those which I have presented to you. But I have said enough to indicate how many and how varied are the problems connected with the subject of bacteriemia, and if I have succeeded in throwing any new light on any of these problems or in suggesting some new lines of thought, I shall feel that I have in some small way earned your kind attention.

It is a pleasure and a duty to express my thanks to numerous former and present members of the house staff of the hospital for much help in making many of the observations, and to them and the visiting staff for many suggestions and much kind co-operation and encouragement.

To Dr. J. C. A. Gerster I am indebted for the beautiful mounting of the specimens and to him and Dr. Epstein for the preparation of the demonstration.

ADDENDUM: APRIL 29, 1906.

Since reading the paper, we have investigated many additional cases, some of which present unusual points of interest. Some of these I hope to publish with Dr. Epstein, who has carried on most of the recent work. I wish to make only two short notes now:

1. A concentric intermittent hemolysis produced by pneumococci on blood plates has been observed twice more. It cannot therefore be a rare phenomenon.

2. The streptococcus mucosus has been reported as being found in the blood current by Otten (D. Arch. f. Klin. Med., Bd. 86, p. 434).

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PROCEEDINGS OF SOCIETIES.

THE JOHNS HOPKINS HOSPITAL MEDICAL SOCIETY.

February 19, 1906.

A Case of Cerebral Lues with Anæsthesia of the Face, with Remarks on the Epicritic Sense and Protopathic Sense of Head. DR. THOMAS.

This patient, A. C., a very light colored woman, is interesting in several particulars. She came to the dispensary in February, 1905, was at that time 31 years old, married. She complained of inability to raise her eyebrows and of pain in the left side of her face. Her family and personal history are negative and unimportant, except that two years before coming to the dispensary she had a miscarriage. No definite history of syphilis could be obtained.

July 4, eight months before coming to us, she noted, while eating that the left side of her face became stiff and two days later there was intense pain all over the left side of her face. This pain was very severe and persisted until her admission. In September, 1904, she had some difficulty in reading which was helped by glasses. On December 4, there was some drooping of the lids and the eyes closed. At this time she went to the Presbyterian Eye and Ear Hospital where she was given iodide of potassium, and there was some improvement.

The examination when we first saw her showed a remarkable picture. Her head was held back and her forehead wrinkled, the eyelids covering the iris almost completely.

She could see only by holding the head far back. Her sense of smell was unaffected, and the eyes were normal as regards the optic nerves and vision. The left eye was fixed in the mid-position, and the right eye was deflected outwards and could be moved only a little outwards and up and down. The pupils were inactive to light and to accommodation. There was therefore on the left side a complete paralysis of the 3d, 4th, and 6th nerves, and on the right of the 3d, and 4th, the 6th only functioning. Further there was paralysis with atrophy of the muscles of mastication, the mouth being deflected to the left when opened. There was anæsthesia of practically the whole side of the face as is seen after the operation for trifacial neuralgia. This area was anæsthetic to all qualities tested. All the other cerebral nerves acted normally.

The patient was given mercurial inunctions and potassium iodide was continued and she began to improve immediately. The eye movements returned markedly in a few weeks. An ulcer developed on the cornea of the left (anæsthetic) eye. The patient was referred to the eye department and in spite of all treatment the condition became worse, and the eye was lost and removed one month after the ulcer appeared. Since that time the specific treatment has been continued and the improvement has been good though somewhat slow of late.

As you see, the movements of the remaining eye are perfect and the pupil reacts to light and accommodation. When the mouth is opened the jaw is deflected to the left, showing that the pterygoids are still weak, but the masseter begins to show some action. In testing for sensation an interesting condition is found. There is present an area over the left forehead absolutely insensitive to all forms of sensation. This area extends down on the side of the face somewhat, but beyond this there is a band which borders the completely anæsthetic area, extending from the level of the tragus downward to the chin in which the patient feels some abnormal sensation. In this band the patient cannot appreciate a delicate touch, but will feel the prick of a pin. In this area the patient cannot distinguish between one and two points of the compass, nor can any but the extremes of temperature be appreciated—ice being felt as cold and a very hot tube as warm. Any stimulation within this area, causes a peculiar, unpleasant tingling sensation, which is poorly localized and radiates throughout the area.

There are then these two distinct areas, the first, anæsthetic to all forms of stimulation, and the second this band-like area in which only certain forms of stimuli are appreciated, and in which they are not localized but give rise to a diffuse radiation.

It was on account of these sensory changes that the case was shown to the Society, for they exemplify conditions to which Dr. Henry Head, of London, has recently called attention. Dr. Thomas had a number of the plates from Head's article thrown on the screen. He said that Head's work was of the first importance, and had apparently been done with the greatest care and thoroughness. Head and his associates had examined very many surgical injuries to peripheral nerves, and Head had had the radial and external cutaneous nerves cut on his own arm, and had made a most careful study of the sensory disturbances. He believes that it was this personal experiment that gave him the clue to the explanation of the condition found in the cases of injury. When a peripheral nerve is cut, there are, as in the patient before the Society, two areas of cutaneous sensory disturbance. One in which no sensory stimuli are perceived, and the other, beyond this area, in which this peculiar sensory disturbance is present. In this border area, light touch is not perceived, the patient cannot distinguish between one and two points of the compass, even when widely separated, nor can he distinguish between a cool and a warm test-tube. He can, however, appreciate the prick of a pin, can distinguish between the extremes of temperature, and the responses are all associated with a widespread tingling, disagreeable sensation. This is what he calls his "protopathic sensation," and he believes it depends upon special nerves. The power of appreciating light touches, as with a cotton wool, of distinguishing between the intermediate grades of temperature, and between one and two points, and in accurately localizing the stimuli, he groups together under the term "epicritic sensation," and believes that this depends also upon special nerves. These two kinds of nerves run together in the peripheral nerves. There seems to be very little overlapping of the epicritic nerves, for, as Head's figures show, when the ulnar nerve is cut, the loss of epicritic sense extends almost exactly to the same line. The overlapping of the protopathic nerves, however, is great and variable and this is the explanation why the area of total anæsthesia varies so much and is always so much less than the anatomical distribution of the nerve would lead one to expect. The rapidity with which these two kinds of nerves recover after injury varies considerably. The protopathic nerves recover first and more certainly. As they recover, the area of complete anæsthesia diminishes and at a certain stage we have the whole area of disturbed sensation occupied by protopathic sensibilities. Head's arm was a beautiful example of this, and gave him a unique opportunity for the study of this peculiar sensory condition. He has promised to present a future article which will deal with this part of the subject more fully.

Head also believes that deep sensation depends upon the sensory nerves which run with the muscular nerves, and he places these nerves in a third category.

DISCUSSION.

DR. BARKER said that the case interested him much, especially on account of Dr. Thomas' reference to the epicritic and protopathic sense of Head and to the nature of the sensory disturbance present in the case. He stated that he had described a very similar dissociation of sensation in an

article entitled "A Case of Circumscribed Unilateral and Elective Sensory Paralysis," published in the Journal of Experimental Medicine in 1896 and simultaneously in the Deutsche Zeitschrift fur Nervenheilkunde (1895). The anæsthesia in the case reported affected the author's own arm and was supposedly due to pressure from a cervical rib. The area of anæsthesia extended in the form of a strip from the axilla down the medial side of the left arm to the little finger. It had been examined by Dr. Thomas in 1894, and during the summer of 1895, while in the physiological laboratory at Leipzig, at the suggestion of Prof. von Frey, the sensory disturbance was exactly worked out by most accurate physiological methods. The pressure points, warm points and cold points were localized one by one at the margins of the anæsthetic area. The great interest of the dissociation of sensation lay in the fact that whereas there was complete absence of certain nervous functions in the anæsthetic area, namely, heat sensation, cold sensation and pressure sensation, the pain sense was preserved. Pricks with a fine needle excited only a feeling of pain without calling forth previous touch or pressure sensations, and were answered by lively reflexes. Ice and heat when first applied called forth no sensation of cold or warmth, but after the lapse of a very short time excited a diffuse sensation of pain. Dr. Barker regarded the findings as strongly supporting von Frey's doctrine of the existence of pain nerves separate from touch and temperature nerves. The reactions to ice and heat he regarded as examples of "temperature pain" wholly independent of the temperature sensation which on the normal skin accompanies or precedes it. In the course of the work exact values for threshold stimuli were made out, for an account of which Dr. Barker referred to his paper. At the time these studies were made it was pointed out that the capacity to localize was very incomplete within an area where pain exclusively is felt. The situation of compass points was appreciated only very inaccurately. Pin points separated from one another by as much as 10 cm. could not be distinguished when care was taken in the application of the test. There are some discrepancies between Head's description of his protopathic sense and the pain sense which was preserved in the arm studied, but Dr. Barker thinks it very likely that Head's protopathic sense may turn out to be identical with the form of sensation he has described under the designation of von Frey's pain sense in the article above referred to.

Head has made a most important contribution in his recent articles, and has had the good fortune to work with an abundant material. He has also resorted, as Dr. Thomas has pointed out, to experiment on himself, a procedure of the greatest help if one desires to be sure of his findings when very delicate matters of skin sensation are in question. Head's theories regarding the nature of what he calls protopathic sensation and its relation to the sympathetic nervous system are of the highest interest and will doubtless stimulate much further study.

March 19.

An Analytical Study of Acute Lobar Pneumonia in the Johns Hopkins Hospital from May 15, 1889, to May 15, 1905. DR. CHATARD.

The following statistics were gathered from the records of the hospital for the sixteen years, during which time 658 patients were treated for pneumonia, excluding ether pneumonias. Of this number 200 died, a percentage of 30.39, though if terminal pneumonias are excluded the number of deaths is 165, or 25.07 per cent.

The number of patients increased steadily up to 1899, but in 1900 and 1901 there was a sharp rise in the number, followed by a large drop during 1902 and 1903, followed again by a rise in the number during 1904 and 1905. During 1900 there was a general increase in the number of patients as ascertained by comparing other records.

Age.—The greatest number of cases of pneumonia occurred in young adults, 20-40 years old, 55 per cent. In patients from 20-30 years old 32 per cent occurred, and 16.5 per cent occurred in patients younger than 20 years. A comparison of the mortality with the age table is interesting. In early adolescence the mortality may be as low as 4 per cent; during the period of greatest frequency, 20-30 years, it is about 20 per cent; and after that period we find a steady rise to 80 per cent of deaths.

Sex.—The male patients far outnumber the female patients, 533 with 154 deaths, compared with 125 females, with 46 deaths. The death rate in the females, 36.8 per cent, far outnumbered that in the males, 28.8 per cent.

Race.—White, 238 patients, with a mortality of 30.6 per cent; foreign, 170 patients, with a mortality of 29.4 per cent; black, 250 patients, with a mortality of 31.2 per cent.

Male mortality, 29.2 per cent; female mortality, 40.4 per cent.

Seasonal Variation.—From January to March there is a rise in the number of patients when the greatest morbidity occurs; while during the summer months there is a great diminution in the number of patients, although the mortality is increased. In March the total number was 116 with a mortality of 28.4 per cent. In July, 19 patients, mortality 52.6 per cent. September, 24 patients, with a mortality of 45.8 per cent.

Occupation.—Greatest number of patients were laborers, or 203, with a mortality of 35.9 per cent; other outdoor occupations gave a total of 347, with a mortality of 34 per cent. Patients with indoor occupations 274 or 26.6 per cent. Alcohol was admitted by 426 patients or 64.7 per cent; mortality 30.9 per cent.

Previous Attacks of Pneumonia.—One previous attack was claimed by 88 patients, two previous by 8, three previous attacks by 3 patients, and 1 patient claimed to have had four previous attacks.

Condition of Patients.—One hundred and twenty-one of

the patients were exposed to bad weather, 19.9 per cent; eight to extremes of temperature; there were eight cases in nurses and orderlies, and three cases among doctors. As regards family history there was a history of tuberculosis in 11.3 per cent of the patients.

Symptoms.—The most frequent symptoms were cough, pain in the side, 79.7 per cent; chill, 49.3 per cent, and dyspnœa, 66.4 per cent. Abdominal pain was present in 51 of the cases or 7.7 per cent. The pulse was considered slow when it registered below 90 beats per minute, and of the patients 3.3 per cent exhibiting this pulse rate, 13.6 per cent died. Patients with a medium pulse rate, up to 125 per minute, showed a death rate of 14.9 per cent, this medium pulse rate occurring in 50.7 per cent. Patients with a rapid pulse, 125 or over per minute, showed a death rate of 49.4 per cent. Of these the number was 289 or 43.9 per cent.

Temperature.—This was subnormal, below 98.5 degrees in five cases with two deaths, 40 per cent mortality; between 98.5-102 in thirty-nine cases, with thirteen deaths, 33.3 per cent mortality; between 102-104 degrees, in 181 patients, with 49 deaths or 27.07 per cent mortality, and between 104-106 in three hundred and eighty-four patients, with 106 deaths, or 27.6 per cent. The temperature was above 106 degrees in forty-nine patients, with 55 per cent of deaths. The admission temperature was generally between 102 and 104, though in one-sixth of the patients it was below 100 degrees.

The respiratory rate was rapid in the majority of the patients; when over 50 respirations per minute the mortality was 54.8 per cent; those patients exhibiting labored respiration and cyanosis gave nearly 50 per cent mortality.

The sputum in the majority of the patients was mucopurulent, tenacious and rusty. In ninety-three patients the pneumococci were found in the sputum, though doubtless present in many more.

Involvement.—In 354 patients the right side alone was involved, with a mortality of 26.5 per cent; the right lower lobe 139 times, being the most frequent. The left side was involved alone 168 times, with a mortality of 20.2 per cent. In double pneumonia, which occurred in one-fifth of our patients, the mortality was about 54.07 per cent.

Pneumococci were isolated from the blood in 25.2 per cent of the patients, and of these 69.1 per cent died. The joints were aspirated in a number of patients and the pneumococci obtained in one. Lumbar puncture was done 9 times, the pneumococcus being found 6 times in cultures and once by smears alone.

Complications.—There were 338 patients with pleurisy, and 11 patients with effusion, a total of 52.8 per cent; mortality about 40 per cent; empyema occurring in 27 patients, 22.2 per cent mortality. Pericarditis was present in 35 patients, mortality 82.8 per cent; endocarditis in 13 patients, 76.9 per cent mortality, and jaundice in 76 patients, with 21 deaths, 27.6 per cent mortality. This latter complication varied in frequency with the years; in 1901 there were 20 patients with jaundice, 13 in 1902, and only 6 in 1900, though there were the greatest number of patients during the latter year. There were 13 cases of meningitis, all fatal. Abscess of lung 5 times, 3 were fatal.

The greatest number of patients showed a leucocyte count of between 25- and 30,000, with the lowest mortality, 19 per cent. The highest mortality occurred among the patients with the lower (below 10,000) leucocyte count, and also in the very high ones,70,000-80,000. Albumen was present in the urine of 511 patients, 77.6 per cent; casts in 166 patients, 25.2 per cent, and the Diazo reaction in 16.8 per cent. Bile was present in 34.3 per cent of the urinary examinations made for it. The chlorides were diminished and below 1 gm. per liter in over 50 per cent.

Otitis media occurred 9 times, all recovered; parotitis 4 times; conjunctivitis 4 times; thrombosis, peritonitis, tonsillitis, and arthritis occurred each three times. There were eight cases of septicæmia, one hundred and forty-nine patients with delirium, mortality 44.9 per cent; twelve being admitted with delirium, 58.3 per cent mortality. Herpes was noted in one hundred and eighty patients, and not noted in two hundred and sixty-five. Where a note was made herpes occurred on the lips in eighty-seven patients, on the nose in forty-three, on the ears in three. In 47 patients the special spot was not noted.

Among the special features delayed resolution was noted in thirty-five patients; relapses occurred in five patients. The average blood pressure was between 125 and 150 mm. of mercury. Terminal pneumonia occurred thirty-five times, or 5.3 per cent.

Defervescence.—Crisis was considered as "true" when occurring in twelve hours or less; "protracted" when occurring in from twelve to twenty-four hours. It was "true" in 99 patients or 15 per cent, and "protracted" in seventy-one patients, 10.8 per cent, and there were seventeen cases of pseudo-crisis. Temperature fell by lysis in 288 patients, or 43.7 per cent. The crisis was usually associated with a fall in the number of leucocytes. The crisis usually occurred from the seventh to the ninth day, though in one patient occurring as early as the third and in two as late as the fifteenth day.

For treatment, stimulants were used in five hundred and thirty-six patients, and symptomatic treatment was employed in four hundred and sixty patients. Measures employed were the ice bag, poultices, sponges, oxygen, and in a few cases the anti-pneumococcus serum. The anti-pneumococcus serum gave little, if any, good results.

Typhoid fever occurred in twenty-one patients as an associated condition, nephritis eighteen times, and heart lesions occurred next in order of frequency.

NOTE.—The above is a brief report of an article on the "General Statistics" to appear later with a series of collected papers entitled, "Studies in Pneumonia."—J. A. C.

Discussion.

Dr. McCrae.—Complications are of little value in the prognosis of pneumonia as Dr. Chatard's paper shows, while in typhoid fever there are a tremendous number of complications, and yet the mortality is low compared with pneumonia. In this series there have been a comparatively small number of empyemata, and the small number (35) of delayed resolutions is surprising. Another point is the heavy death rate with delirium, this symptom speaking for a severe toxæmia. The low death rate with jaundice is surprising.

Dr. Marshall spoke of the difficulty in diagnosing pneumonia in young children early in the disease. There was a house epidemic of twelve cases in which the young children would for two or two and a half days have a marked rise of temperature, with a high leucocytosis, without physical signs. The ratio between the rate of the pulse and the respiration, emphasized in the text books, proved to be a fallacy. In these cases an early diagnosis was aided by the suppressed breath sounds, and a slight diminution in the expansion of the affected side, followed later by a few râles and some dullness.

Clinical and Experimental Observations on Cheyne-Stokes Respiration. Dr. Eyster.

This communication is based upon the results obtained from ten cases in which continuous tracings were taken as records of the blood pressure in its relation to the respiratory changes.

There were found two groups of cases: first, cases with a rise of blood pressure and an increase in pulse rate during the period of dyspnœa, and a fall during the period of apnœa, and second, cases with a fall during dyspnœa and a rise during apnœa.

In the first group there were two cases of increased intracranial tension, the first of which was admitted to the hospital with a history of left-sided clonic spasms, intense headaches, and a choked disc of the left eye. The Cheyne-Stokes breathing was marked, with periods of apnœa of one minute or longer, the dyspnœic periods being relatively short. The blood pressure tracings were made by means of the Erlanger sphygmomanometer. The systolic and diastolic pressures were first determined and the instrument set midway between these points and a continuous record taken. With a fall of the blood pressure the pulse waves decreased in size owing to the diastolic pressure being removed from the point at which the instrument was set. A rise of pressure produces the opposite effect.

The following points were observed: first, the Traube-Hering waves of blood pressure disappeared with the disappearance of the periodic respiration; second, the relative lengths of the periods of apnœa and dyspnœa varied with the extent of the rise and the fall of the blood pressure.

Increased intracranial tension was produced experimentally in dogs by trephining the skull and screwing into this opening a canula connected to a pressure bottle filled with salt solution that could be elevated and lowered at will, thus securing various degrees of tension. Periodic respiration was obtained and was always accompanied by changes in the blood pressure. The simple rise and fall in the blood pressure is not sufficient to produce periodic respiration, but the rise must be above and the fall below the line of intracranial pressure. With these conditions it was found in the periods of dyspnœa there was a rise of blood pressure, and during apnœa a fall of the pressure, the rise and fall being above and below the intracranial pressure.

Tracings from the cases of increased intracranial tension, showed a rise in the blood pressure associated with each group of respirations, and an increase in pulse rate accompanying the increased blood pressure. Cheyne-Stokes respiration in these increased intracranial tension cases is not by any means always the typical text-book type, small groups being common, groups of two or three respirations. After the disappearance of the periodic respiration there was disappearance of the blood pressure changes.

The second case of this series, one of cerebral hæmorrhage, shows the same changes described above.

In a second group of eight cases of Cheyne-Stokes respiration associated with cardiac and arterial disease, tracings were shown from a case of aortic insufficiency and myocarditis. The tracings from this case showed a fall of blood pressure leading up to about the first third of the period of dyspnœa with a decrease of the pulse rate, then up to the middle of the following period of apnœa there is a rise of blood pressure and an increase in the pulse rate. A curve was also shown demonstrating that the blood pressure changes are not due to the effects of the periodic respiratory activity itself. This tracing was taken from a normal individual who breathed periodically and simulated Cheyne-Stokes respiration. In this tracing an entirely different series of blood pressure changes is observed. The periodic respiration obtained in a dog after section of both vagi was accompanied by no difference in the pulse rate during the periods of apnœa and dyspnœa.

The underlying condition of periodic respiration in cases of increased intracranial tension is evidently an alternate anæmia and period of blood supply to the brain and medullary centers. The former is associated with apnœa and occurs when the blood pressure is below the line of intracranial pressure. The period of respiratory activity is associated with the period of blood supply to the brain, and occurs with the rise of the blood pressure above that of the intracranial pressure. These changes in blood supply should cause the opposite effect upon the respiratory center to those observed, if the stimulus to the center were all that need be considered, as this stimulus (increase in carbon dioxide and decrease of oxygen) is certainly greatest when the anæmia is greatest. Another factor has to be considered, however, a loss of irritability of the respiratory center with a much decreased blood supply. This irritability is periodically much reduced or lost when the blood pressure is below the line of the intracranial pressure, and hence such periods are asso-

ciated with apnœa. This loss of irritability of the respiratory center is also shown in experiments upon brain anæmia following the ligation of the cerebral arteries. Entirely different conditions are present under these circumstances from those in asphyxia of the center following ligation of the trachea. Here the carbon dioxide increases and the oxygen decreases to an enormous extent, but the blood supply to the brain and centers is normal or increased and the respiratory center responds almost until the death of the animal.

The explanation of the second group of cases is not at all clear at present. Mosso has recently obtained continuous records of the blood pressure in periodic respiration occurring in normal persons at high altitudes, and he separates apparently a third group. This group shows a rise of the blood pressure accompanied by a slowing of the pulse rate with each respiratory period.

DISCUSSION.

DR. ERLANGER emphasized two points. First that Cheyne-Stokes respiration was described as early as 1816 and again in 1850, and that since that time it had been investigated by scores of physiologists, but no clear cause had been given until Dr. Eyster had taken up the problem. Secondly the reasons for this were no doubt due to two causes: first, to improved methods of investigation, and second, to the assistance from clinicians and the members of the staff of the hospital. This offspring was the first to result from the union of the wards and the laboratory.

The Toxic Constitution of Amanita Phalloides. DR. W. W. FORD.

This paper deals with a toxic principle found in the fungus and not noted by Kobert. The phallin of Kobert is strongly hæmolytic and to it may be attributed all the lesions found in man due to destruction of red blood cells. Experimentally lesions referable to hæmolysis may be produced, such as hæmoglobinuria and pigmentation of the spleen, but in addition, subcutaneous œdema, hæmorrhages, and necrosis of various organs are found. Are these the result of intracorporeal hæmolysis?

In animals the amount of blood destruction produced by fatal doses is too small, by itself to account for the profound intoxication. We may explain the lesions by first, the liberation of poisonous substances by the breaking down of red blood cells; second, the action of phallin on other cells of the body; third, the presence of others poisons in *Amanita phalloides* in addition to phallin.

The last hypothesis is shown to be correct by the following experiments:

(a) Extracts of the fungus when heated to 65 degrees C. for one-half hour, the temperature at which the hæmolysin is completely destroyed, are still strongly toxic to animals, in which they produce hæmorrhage and necrosis, but no subcutaneous œdema, no pigmentation of the spleen, and no hæmoglobinuria.

(b) Pepsin and pancreatin digest the hæmolysin but leave unimpaired the heat-resistant body.

(c) Extracts of the fungus cannot be neutralized by blood, as tetanus toxin and the neuro-toxic constituent of cobra venom are by brain tissue. There are present in *Amanita phalloides*, therefore, thermolobile (hæmolytic) substances and thermostabile (necrotising substances). In ricin Jacoby has shown that, whereas he first believed there were separate poisonous substances present each with its own haptophoric and toxophoric group, in all probability there is but one substance composed of two toxophoric groups attached to one haptophoric group. In *Amanita phalloides* we may imagine two different toxic constitutions.

1st. A single haptophoric group united with two toxophoric groups, one hæmolytic and one necrotising.

2d. Separate haptophoric groups each united to its own toxophoric group. The true conception may be determined experimentally.

If we destroy the hæmolysin and immunize animals to the heated material, if the anti-serum is merely anti-toxic and not anti-hæmolytic then there must be different haptophoric groups in the extracts. On the other hand if the anti-serum be anti-hæmolytic as well as anti-toxic then but a single haptophoric group is present. Animals immunized to extracts heated to 65 degrees C. and to 80 degrees C. one-half hour, develop anti-sera, which are anti-toxic to the heated material only, no anti-hæmolytic principles being found. We have present in the fungus therefore, toxic and hæmolytic principles, each with its own separate and distinct toxophoric and haptophoric groups.

In short *Amanita phalloides* contains in addition to phallin another distinct toxin.

April 2, 1906.

Report of Five Cases of Pneumonia Occurring in One Family. DR. FABYAN.

Dr. Fabyan reported a series of five cases of pneumonia which entered the colored wards during March of this year. There were two girls and three boys, all from one family. A careful study of these cases and the home conditions was made.

Among the etiological factors might be mentioned the house where the family lived. This is a dilapidated old wooden structure near which is running dirty water. A privy is situated about 50 feet away. On the first floor of the house the two older girls of the family occupied one room until about three weeks before the outbreak of the disease, when they moved to the garret. There was great crowding in one of the rooms on the first floor, four persons occupying one bed, and two and three others, cots. Some of the children had suffered from whooping cough a short time previous to the pneumonia outbreak.

The father stopped work March 8 complaining of a cold and misery in the stomach. There was no pain in the side, dyspnœa, cough or fever. On March 11, one child was taken ill,

three days later, March 14, a second child became ill, three days after this another child became sick, still another one day later, and still another two days later. The eldest daughter returned home at this time to assist the mother in nursing the sick members of the family but up to the present time they have both remained well.

There are no animal pets in the house, nor is there any illness in the neighboring factory. Second-hand blankets had been purchased and after cleaning, had been used on the beds of the family. The nursing was all done by the mother, father, and eldest daughter.

In the earlier cases the onset was sudden, with headache, epigastric pain, and cough. Diarrhœa was a constant feature in all but one of the cases. The first patient entered the hospital with the typical signs and symptoms of pneumonia, the pneumococcus being isolated from the blood in pure cultures. This patient died. At autopsy there was found a yellowish pleural exudate, the lungs contained firm areas, especially the upper lobes. There was a similar yellowish exudate in the abdominal cavity, with a general involvement and reddening of the abdominal and pelvic viscera.

The second patient entered the hospital with consolidation of the left lower lobe. The third patient presented signs of an involvement of the right upper lobe, the fourth patient signs of involvement of the right upper lobe—this patient is now up and about the ward. The fifth patient was the only one to have herpes, and had indefinite signs of consolidation. There was no diazo reaction present in any of the cases.

The occurrence of these cases suggests contagion, though this is not absolutely necessary. In 1885 Blyth called attention to the probable infectious nature of pneumonia. Epidemics have been reported at different times, epidemics of many hundred cases occurring in communities and having high mortalities. Dr. Osler has reported 10 cases in one family, cases of a very severe type of the disease.

Under the head of house infections there are records of as many as 32 cases occurring in one house in 4 years, and 8 cases in another house in 9 years.

Still another group of cases reported are those in which house pets, especially parrots, played an important part in spreading the disease. Also certain articles from the sick room have been known to carry infection. In one instance the bedding from the deathbed of a pneumonia patient after being carried two miles, was 3 weeks later placed on the bed of a child who immediately developed the disease.

To summarize this series of cases, there were nine persons living in one house, five of whom developed the disease. In four cases it was a frank pneumonia. One case died and showed typical pneumococcus pneumonia and clinically the disease is supposed to be the same in the other cases. The rooms in the house where the infections occurred were generally neat, and the sputum was well taken care of. All but one of the patients were predisposed by previous attacks of whooping cough. As a possible means of infection the blankets must be thought of.

Metaplastic Bone Formation. Dr. Bunting.

The ossification of calcified cartilages in the aged is so frequently seen that it excites no comment, but the presence of foci of bone in organs where there is no pre-existing perichondrium or periosteum arouses one's interest and at first seems difficult of explanation. The specimen submitted is from the calcified aorta of a man aged 72 years, who died of broncho-pneumonia. The bone masses lie in the thickened intima and adjacent to a deposit of calcium salts in the hyaline media, at a point where the media is penetrated by an artery accompanied by granulation tissue.

Such a picture is unusual but not unparalleled, as a search of medical literature shows five cases of bone formation in the aorta and more numerous cases where the foci have been found in smaller vessels and in heart valves. One cannot resort to the Cohnheim displacement theory in explanation of these foci because of the frequency of their occurrence in calcified vessels, and in fact in practically every organ where calcium deposits are found, surrounded by granulation tissue, and finally because of the experimental production of such foci about calcium-containing foreign bodies in the peritoneal cavity—and in necrotic and calcified kidneys following ligature of the renal vessels. The process is a metaplasia of cells of the young granulation tissue and appears as a result of the chemical stimulation of the calcium salts. The bone may be formed apparently either by the formation of a callus or ostoid tissue with its subsequent conversion into bone or by erosion of the calcified material and deposit of bone by osteoblasts as in the normal development at the epiphysis.

This specimen is interesting further in the presence adjacent to the bone of a focus of cellular marrow containing all the elements usually found in the red marrow of cancellous bone. Here too one probably has the result of metaplasia of cells of the granulation tissue, and it seems most likely of cells of the mononuclear type, hæmatogenous in origin, such as are always found in granulation tissue, rather than of the fixed connective-tissue cells. This seems more probable than the assumption that one has here the emigration of a parent cell for each of the types found in the focus of marrow. Such being true the case is strong evidence for the presence in the hæmoporetic organs of a cell of indifferent type which retains throughout life the capability of differentiating into the various types of blood cells.

April 23, 1906.

Experimental Heart Block. Dr. Cullen and Dr. Erlanger.

The main object of this communication was to show to the society a dog in which heart block had been produced by crushing the auriculo-ventricular bundle of His, but unfortunately the animal died a few days ago.

The series of experiments which included this case was undertaken at the suggestion of Dr. Welch with the object of attempting to produce Stokes-Adams disease in the dog

by destroying the auriculo-ventricular bundle of His. The operations to destroy the bundle were performed as follows: Under artificial respiration through a tracheal cannula, two ribs were resected, the pericardium was opened, and, by means of an instrument attached to the aorta, the heart was drawn well up into the wound in the chest wall. After heart block had been produced the pericardium was sutured and the wounds in the chest wall and trachea closed.

In the first series of experiments the attempt was made to destroy the auriculo-ventricular bundle by injecting into it with a hypodermic syringe a solution of iodin in alcohol. On account of the small size of the bundle and its hidden position this procedure is a difficult one, but in each case the operation was successfully completed not, however, until several attempts had been made.

Case 1. After the completion of the operation this animal had heart block but the block was gradually passing off when the animal died 18 hours after the operation.

Case 2. This animal also presumably had a partial block from which it was recovering when it died of secondary hæmorrhage two hours after the completion of the operation.

Case 3. After recovery from the operation this animal had a partial block with a two or three to one rhythm, but the auriculo-ventricular sequence became normal one month later. A second operation was then performed at which it was found that the return of the heart to normal was due to the resumption of conduction by the auriculo-ventricular bundle.

Case 4. This animal became normal after one day of very slight heart block.

The recovery of the heart from the block produced in this first series of experiments was probably due to the fact that the method did not suffice to destroy completely the auriculo-ventricular bundle. Therefore in the second series of experiments another method was employed; the bundle of His was crushed with a specially devised clamp.

Case 1. This dog died from hæmorrhage.

Case 2. This dog died on the table from some unknown cause.

Case 3. In this case the operation was entirely successful and the animal forms the most important case in the entire series. The date of the operation, which was thoroughly successful, was March 17, 1906, and the dog lived until April 13, 1906. Before the operation the rate of the animal's heart had been 150 per minute. After the destruction of the auriculo-ventricular bundle the block was permanently complete. The rate of the auricles, when the first observations could be made, was 140 per minute while that of the ventricles was about 60 per minute. The rate of both the auricles and the ventricles decreased more or less progressively up to the time of death, the rate of the ventricles decreasing to about 40, and that of the auricles to about 70. The animal fed well, was playful, and seemed normal in almost every way till the day of its death, which was sudden and unexpected. At the autopsy the only cause of death found was pulmonary œdema.

This dog had no symptoms of syncopal attacks but nevertheless it occasionally had the cardiac signs sometimes seen in human beings during these attacks. In simultaneous tracings of the respirations and heart beat made at such times the following phenomena may be seen: The respirations are of the Cheyne-Stokes type. Simultaneously with the beginning of the periods of hyperpnœa the auricular rate increases and the ventricular rate decreases. The auricular rate decreases and the ventricular rate increases usually somewhat before the onset of the period of apnœa. These changes in rate are very marked. In one place, for example, one ventricular period lasts 1.6 seconds during the apnœic period while during the subsequent hyperpnœic period the longest ventricular period is 4.4 seconds. Similar changes in heart beat and respirations have been seen in man in association with syncopal attacks.

Since there is every reason for believing that in the case of this dog the heart block was absolute, it becomes necessary to abandon the explanation, suggested in another place, of the syncopal attacks seen in man in association with Cheyne-Stokes respiration. In the absence of experimental data it might now be suggested that the variations in the auricular and ventricular rates, as well as that of the respiratory rate, are associated with rhythmic variations in the activity of the nerve centers in the medulla. It has been demonstrated that the vagus nerve exerts but a minimal influence over the ventricles in complete block, whereas the accelerators in such a case preserve their normal influence over auricles and ventricles. Therefore, in heart block, simultaneous stimulation of the medullary centers would probably slow the auricles and accelerate the ventricles, and simultaneous depressions of the centers would have the opposite effects.

Physiologically these experiments are significant in that they demonstrate beyond doubt that the auriculo-ventricular bundle of His constitutes the only path of conduction from auricles to ventricles. The objection might previously have been raised that the results obtained in experiments of comparatively brief duration do not suffice to prove that the auriculo-ventricular bundle is the sole physiological connection. Thus it might have been objected that in the limited time of an experiment other connections which perhaps exist did not have time to become functional. However this objection loses its force in the light of the fact that heart block may remain complete 27 days after crushing the auriculo-ventricular bundle. Furthermore, this fact indicates, although it does not prove, that the conducting tissue of the auriculo-ventricular bundle is muscular and not nervous.

That in man the auriculo-ventricular bundle is the only physiological connection between auricles and ventricles is proved by the autopsy findings in at least three cases of Stokes-Adams disease. Perhaps the clearest of these instances is the one reported by Jellick, Cooper, and Ophuls. In this case the block was caused by anæmic necrosis of the auriculo-ventricular bundle.

The results of histological examinations of the material obtained in these experiments will be reported to the Society at a later date.

Surgery of the Blood-Vessels and its Application to the Changes of Circulation and Transplantation of Organs. DR. A. CARRELL, OF CHICAGO.

The work along this line was begun in 1891 at Lyons, in France, and it may be divided into a number of groups or divisions.

I. Operations acting directly on the blood-vessels, of which there are the following subdivisions.

(a) Partial stenosis, an operation to produce a diminution in the lumen of a vessel.

(b) Longitudinal exclusion of a vessel by means of longitudinally placed purse-string suture to lessen the circumference of the vessel.

(c) Patching, by sewing patches into the walls of a vessel. We have used many substances, among them the peritoneum, which latter substance functioned perfectly, the animal—a cat—living for seven months after the operation. To anastomose small vessels with big ones we use the patch method, flaring out the end of the small vessel by means of a longitudinal incision and applying this as a patch to the side of the large one.

(d) Anastomoses. These may be termino-terminal, termino-lateral, the important part of the operation being anchor threads which divide the circumference of the vessels into quadrants, and which allow of good approximation and suturing. There are some slight modifications of the technic as when arterio-venous or arterio-arterial anastamoses are made. In all work of this kind the most perfect technic and asepsis are necessary to obtain any results at all.

(e) Transplantation of veins and arteries. We may dissect out the vessels and transplant either the vein to the artery or the artery to the vein. The main purpose of such experiments is to judge the effect on the veins when an artery is transplanted into them and the venous walls subjected to the arterial pressure. By this method it is also possible to increase the pressure in the veins and diminish it in the arteries. When the pressure in an artery is increased by transferring all its pressure into a closed venous system like the thyroid veins for example, the arterial walls undergo a sclerosis. This results from increased pressure alone and is assisted by no toxic factor. On the other hand by transferring the arterial pressure into an open system of veins we get a diminution of the arterial pressure with a weakening of the walls. This might be used as a possible cure for sclerosis.

Accompanying these changes in the arterial walls the veins thicken enormously from the increased pressure, becoming from two to three times their normal thickness and exceeding that of the arterial wall. The nutrition of the wall of the transplanted piece is perfect and an interruption of this nutrition for from twenty minutes to two hours appears to have no evil effect.

In the experiment of transplanting a piece of artery into another artery there is no change in the walls of the transplanted piece, but in the walls of a piece of vein transplanted into an artery there is the same great hypertrophy. We may conclude that vessels adapt themselves very quickly to changes in pressure and circulation.

II. Operations on the blood-vessels indirectly through their nerves. a. temporary denervation, by (1) elongation, and (2) by crushing. This series of experiments and their results is still in a crude state as fibers of nerves of different functions are cut at the same time, e. g., constrictor and dilator fibers.

The experimental application of these operations is very broad. The following experiments are described to show the effects of many of these methods:

a. Artificial modification of the circulation through (1) the limbs, (2) the head, and (3) other organs. First in the limbs. The lateral anastamosis between the femoral artery and vein showed three hours after the operation that the valves in the vein were still competent and there was no effect noted. However four hours after an end anastamosis the red blood flowed through the vein and the artery contained the dark blood. A complete reversal of the circulation in its major portion caused death, due to the accumulation of red blood in the veins.

Secondly, the arterial modification of the circulation to the head is easily accomplished, as the veins in this area are without valves. In one case where the arterial circulation was turned into the superficial veins of the neck, eight months later the superficial veins were like arteries and the skin was much thickened. The circulation to the head may be modified (a) by the transformation of the superficial veins of the neck into arteries, (b) by the attempt to supply arterial blood to the brain through venous channels, and (c) operations regulating or diminishing intracranial blood pressure.

Thirdly, in regard to organs we may (a) change the kind of blood to an organ. This was successfully accomplished in the case of the thyroid gland in a goitre case in a dog. By this reversal of the circulation the thyroid became smaller and smaller and the symptoms of the disease disappeared. Or (b) the circulation may be modified to produce an active hyperæmia by means of a temporary denervation or by an elongation.

Under still another head will be considered replantations and transplantations of organs and limbs. First, replantations of the thyroid are readily performed. The gland is extirpated and replaced by making careful anastamoses of the blood-vessels and eight months later the glands have been examined and found perfectly normal. Second, the transplantations and replantations of the kidney have been successful. Third, limb replantations have been done. The thigh of a dog was amputated with a circular incision and the vessels cut in the region of Scarpa's triangle. After one and one-half hours disturbance of the circulation the bone, muscles, aponeuroses, vessels and skin were carefully sutured. Of course there was a complete paralysis of the limb and some elevation of temperature resulted from the operation.

In the first case tried there was considerable œdema of the limb below the amputation but this was found to be due to the dressings. The main difficulties of this operation are asepsis and a suitable means of dressing the limb.

Transplantations of organs are of two types, (a) simple, and (b) *en masse*, and have been successfully performed on the thyroid, ovary, thigh, lungs, and the suprarenal bodies. First, the simple form has the great drawback of cutting all the nerves to the transplanted organ and therefore the second form of the operation, *en masse*, is the best. By this method all the connective tissue, nerves, and large segments of the main vessels are preserved. A portion of the small bowel in this manner was transplanted into the space left by removing a portion of the œsophagus with a perfect result, also was the heart transplanted in various manners, and twenty minutes later the auricles began to beat, and one hour later the ventricles, the experiment being terminated two hours later. Lungs have been successfully transplanted but become œdematous.

The kidney and suprarenal have been successfully transplanted, both homo- and auto-transplantations, normal urine having been obtained from kidneys thus implanted. Likewise in a case of homo-transplantation of both kidneys to another dog, the animal remained perfectly normal for eight days, the urine showing variations within perfectly normal limits.

From the above experiments I believe it is improper to draw definite conclusions. I do not say we will get as good results in man, as the conditions of the circulation and the red blood corpuscles are no doubt different. However this new technic may be of some use in the course of time, and some of the experiments may lead to the establishment of therapeutic methods, especially in the treatment of wounds of the large arteries and veins.

The methods are very simple, the fine silk, fine needle, vaseline for the coating of the suture, accurate approximation without invagination, and perfect technic being the only requirements.

The present surgical treatment of disease is either cutting or extirpating; now why not influence the circulation to the diseased part or organ and thus its nutrition, or extirpate it and replace it with a sound one. It is reasonable to suppose that by increasing the red circulation to a diseased organ or part that it will aid its attaining a more normal function.

The clinical application of these methods may be divided as follows: a. to present vascular surgery, (1) treatment of aneurysms, (2) to the treatment of artery wounds; b. to surgery of organs and limbs, (1) operations changing the metabolism of diseased organs by acting through the circulation, (2) transplantations of organs, (3) through the nerves instead of by the vessels directly, though caution must be observed here as, while a partial denervation of the kidney is not to be feared, a complete one will cause degenerative changes in the cells of the tubules.

The question of the transplantation of organs in man is a very serious one and difficult, for will the transplanted organ remain and function normally after a long period of time? Another difficulty would be that of finding organs suitable for transplantation into man. A process of immunization would no doubt be necessary before organs of animals would be suitable for transplantation into man. Organs from a person killed by accident would no doubt be suitable.

In closing I wish to say that this work is still very incomplete as it has been carried out under not the best circumstances. I hope others will continue with the research.

DISCUSSION.

DR. HALSTED said he had been especially interested in the paper and that there was work here for an army of investigators. It seems but reasonable to expect that in a short time there will be great revelations resulting from such work.

This work has another side of especial interest to surgeons —for the first time it seems necessary for surgeons to develop great manual dexterity, it not being possible for every one to employ these methods. This work also emphasizes the great importance that the surgery of the arteries bears to surgery in general, and even those who do not expect to make contributions would do well to familiarize themselves with this work in order to gain facility in the handling of large vessels.

DR. WATTS said he wished to emphasize what Dr. Carrell had said in regard to perfect technic. Dr. Watts had done ten operations upon the jugular vein and the carotid artery, all of which had been successful, though a number of cases on the femoral vessels had failed, as absolute cleanliness is harder to obtain in this latter region.

DR. WELCH said this paper had been a most startling presentation of a field suggesting an entirely new line of work. In regard to one point made by Dr. Carrell, that increase of blood supply alone could produce an increase of growth as shown by increased karyokinetic figures, Dr. Welch thought other factors were necessary besides the mere increase in the blood supply.

Common Yeast (Saccharomyces cerevisiæ) in the Treatment of Rheumatic Affections. DR. PENROSE.

The common yeast, Saccharomyces cerevisiæ, is a sprouting fungus producing spores, and causing an alcoholic fermentation with the liberation of carbon dioxide. This yeast can split up albumen, and its powerful germicidal action, both inside and without the body, is due to its great vitality and powers of propagation, and to its power of stimulating the formation of lymphocytes. Yeast also has a laxative effect which is an aid to its other effects.

Salicylic acid is of benefit to the rheumatic patient and it is reasonable to suppose it is because it favors the growth of the yeast present in the stomach. Yeasts added to the salicylic acid treatment greatly aid the action of the former.

In one case of severe acute inflammatory rheumatism the yeast treatment was tried and the man was up and about the ward free from pain in two weeks. The yeast is given often during the day and does not interfere with the liquid food. Several other cases have been markedly aided by this form of treatment.

May 7, 1906.

Loco Disease in the West. Dr. H. T. Marshall.

(To be published later.)

Exhibition of Medical Cases. Dr. Emerson.

Unilateral paroxysmal hæmoglobinuria.—The first patient is a man aged twenty-eight years, who has been in this hospital four times, the first admission five years ago. His personal history is negative except for the fact that six years ago he made a voyage to the West Indies as a sailor. For five years the patient has been suffering from a severe anæmia, with an oligocythemia of about one million red cells and a color index of about one. The leucocyte count is normal; there have been few nucleated red cells.

At no time have the blood counts been over one and a half million cells. This case is of interest as illustrating on his previous admission the independence of the blood count and the subjective symptoms so common in pernicious anæmia, although the count was no higher on his discharge than on admission, the patient felt well enough to go home. In other cases the count rises during their stay, then falls, and the death comes when the count is that on admission. This independence of the blood count to the symptoms has been a striking feature of our series of cases in this hospital.

The first symptom for which this patient was admitted was bloody urine, which turned out to be pure hæmoglobinuria. This has continued for a few weeks, then clears up entirely, later to reappear. The hæmoglobinuria in this case is of particular interest in that for a time it was present from one until nine o'clock in the morning, while during the rest of the day the urine was clear. Examination with the cystoscope showed red urine coming from the right kidney only. The condition is therefore one of *unilateral paroxysmal hæmoglobinuria.* The diagnosis has not been made in this case. He has tuberculosis of the lungs, a large spleen and liver and a pulsating mass in the left renal region.

A Case of Combined Morbus Errorum and Addison's Disease.—The second case is a man aged fifty years, who has worked as a tobacco seller. He came in complaining of weakness. His personal history is negative, his habits good. The patient led an active life up to one month ago. Associated with the weakness there has been shortness of breath and pigmentation of the skin.

On admission there was found a marked condition of vagabond's disease, the pigmentation being general over the body, but most marked on neck, shoulders, waist line, genitals, and proximal segments of both extremities. However, in addition to this body pigmentation there is considerable pigmenting of the mucous membranes of the mouth. The blood pressure is low—60 to 80 mm. of mercury.

The question arises, is the pigmentation due entirely to the body louse or to Addison's disease also. In favor of the latter view is a positive tuberculin reaction, the low blood pressure and the weakness, all of which point rather strongly to Addison's disease, though there has been no gastric or muscular irritability.

Tetany.—Case three is that of a colored woman aged thirty-five, who came in complaining of "drawing up of the hands"—a case of tetany. The family history is interesting since one brother died at thirty-four years of age with spasms of the same nature as those complained of by this patient. The patient's personal history is negative as regards gastro-intestinal symptoms, positive as regards pelvic troubles.

The present illness began four months ago, at which time the patient was ill in bed for one week. Two months later she had her first attack of tetany in the wrists and fingers. Since her admission the spasms have been limited to the hands and the fingers.

The patient has no enlargement of the stomach but there is almost total anacidity. There is definite chronic nephritis.

Discussion.

Dr. MacCallum mentioned a case of tetany in a woman sixty-five years old, with anacidity and without dilatation of the stomach in which case the parathyroid glands showed abundant mitotic figures demonstrating that these glands were trying to overcome the poison of tetany.

The Relation of Various Strains of Dysentery Bacilli to the Diarrhœas of Infancy. Dr. Knox.

The following results of investigations on infant diarrhœa were carried out by Mr. Schorer and myself and I regret that he is unable to be present this evening to communicate his portion of the subject.

The association of some variety of the dysentery bacillus with a large number of the cases of epidemic diarrhœa in infancy has been definitely shown, through investigations carried on under the direction of the Rockefeller Institute for Medical Research. In the present series of cases an effort was made to isolate all organisms which could be supposed to be casually related to the disease, *i. e.*, all pathogenic organisms, all bacteria which agglutinated with the patient's blood and all dysentery bacilli. Seventy-four cases in all were studied. They were not selected but were taken *seriatim*, according to the admissions, at The Thomas Wilson Sanitarium. The series comprised several clinical varieties of the disease: (a) toxic forms with fever and an acute onset (dyspeptic diarrhœa); (b) cases with evidence (either clinical or post mor-

tem) of definite inflammatory changes in the intestine in addition to the symptoms of group a (ilio colitis). Of the first variety there were thirty-six cases out of the total seventy-four, and of the second, or inflammatory type, there were twenty-nine cases. A third and smaller group (c) of cases were termed cases of intestinal indigestion.

The methods of obtaining cultures were two: from the stools, by selecting bits of mucus and washing these in salt solution before making cultures, and secondly by scraping the intestine at autopsy. In our series the cases showing blood were thirty, and thirty-one had purulent material in the stools. The dysentery organism was found more readily when there was pus present—in 93 per cent of the cases with pus and in but 63 per cent of the cases when the stools contained only mucus with or without blood, while in 22 per cent of the cases studied the organism was found only at autopsy and had not been demonstrated during life. Altogether there were three hundred isolations made.

The organisms isolated were as follows: In six cases, streptococci in pure cultures; streptococci were present in eleven other cases; in two cases colon bacilli were present alone; in two cases, pyocyaneus alone, both of which organisms agglutinated with the blood of the patients. There were two cases with more or less extensive pseudo-membrane, one of which yielded a pure culture of the dysentery bacillus immediately while the other did not. All the cultures fell into one or another of the four groups of dysentery bacilli described by Hiss. The commonest strain found was the "Y" bacillus of Hiss and Russell, then the Flexner-Harris, and then the original Shiga. The agglutination reactions were tested as a routine with anti-dysentery serum and with the patient's blood, though with varying success. The serum reaction does not play as important a part in the diagnosis of this disease as it does in the case of typhoid fever. Absorption with the various sera—experiments showed that the Flexner-Harris serum had the largest amount of common agglutinins, the other forms possessing less, though all forms possessed some agglutinins in common.

The largest number of cases associated with any one form of bacillus was fourteen in which the "Y" form was found. Many infants belonging to this group were very ill; five were admitted in partial collapse. Several were very young (under one month old) on admission. Six cases were found infected with the Flexner-Harris organisms, the cases presenting widely different symptoms. Of these latter six cases, four recovered and two died. There were thirteen cases with mixed dysentery bacilli infection and all of these were severe cases, including eleven cases of definite ulcerative ilio-colitis, and one of tuberculous colitis, a double infection. These cases were usually admitted late in the summer. The stools were for the most part muco-purulent and blood stained. Nine died and seven at autopsy showed an ulcerative ilio-colitis.

The dysentery bacillus was associated with the streptococcus eleven times, of which cases seven resulted fatally, a mortality of 67 per cent, and of the seven two had dyspeptic diarrhœa and five ilio-colitis. Streptococci were found alone in six instances, one case with ilio-colitis, three mild cases with dyspeptic diarrhœa, one with a mild diarrhœa after prolonged malnutrition, and one with an intestinal indigestion.

In five cases were other organisms found: two cases of colon bacillus infection, two of pyocyaneus, and one of a non-pathogenic organism.

In ten cases no organism was found at all, but several of these cases came in late at the end of the season and no autopsies were obtained.

The summary of the seventy-four cases studied is as follows: Forty-two, or 58 per cent, showed the presence of some of the four varieties of bacilli studied: streptococci were found in fifteen cases or 22.9 per cent; in ten cases no pathological organism at all was found. These were the late cases mentioned above. The organisms were found twice in other places than the alimentary canal, once in the liver and once in the mesenteric glands.

Differences in the severity of the illness can be noted in the several groups into which the cases have been divided according to the bacterial findings. Thus the largest proportion of instances of ilio-colitis and the highest mortality in any one group was noted in the series associated with more than one type of the dysentery organism. Here twelve out of the thirteen cases were ilio-colitis and nine died, a mortality of 69 per cent. Next in order of the severity of the infection is the group in which streptococci were found together with dysentery bacilli. Of these cases, eleven in number, seven were ilio-colitis and seven or 63.6 per cent died.

Of the fourteen cases associated with but one type of dysentery organism those with group II or Hiss "Y" bacilli seemed most severe. Six of them were instances of ilio-colitis and seven of them, or 50 per cent, ended fatally.

There were no extremely ill patients among those in whose dejecta unclassified dysentery bacilli, or pathogenic micro-organisms other than dysentery bacilli, or streptococci, were present.

INDEX TO VOLUMES 1-16 OF BULLETIN.

A subject and author index of the first sixteen volumes of the Johns Hopkins Hospital Bulletin is now ready. As the edition will be limited, it is desirable that orders be sent in as promptly as possible.

Price bound in cloth is fifty cents.

Orders should be addressed to the Johns Hopkins Press, Baltimore, Md.

NOTES ON NEW BOOKS.

Lectures on Tropical Diseases. Being the Lane lectures for 1905, delivered at the Cooper Medical College, San Francisco, U. S. A., August, 1905. By SIR PATRICK MANSON. 230 pp. [86 figs.] 8°. (*Chicago: W. T. Keener & Co.*)

An interesting, rather than a profound discussion of tropical medicine, illustrated with figures, most of which contribute but little to an exact understanding of the subject.

The Surgical Assistant. A Manual for Students, Practioners, Hospital Internes and Nurses. By WALTER M. BRICKNER, B. S., M. D., Chief Surgeon of Mt. Sinai Hospital Dispensary. (*Published by International Journal of Surgery Co., New York, 1905.*)

An interesting book to one who is making his debut in the operating room, giving some idea of what one's attitude should be and what a high potentiality of usefulness one may carry; a book indeed which may be even of more value to the hospital resident or operator who needs to instruct new assistants from time to time, inasmuch as by referring them to it he can expect them to be wise when they come into the operating room to the things which under usual circumstances he may find himself telling them at the end of the first month. The "dont's" alone, especially the shorter ones, if kept in mind will aid much in maintaining the proper relation of the new man on the staff.

The advice on cleaning up is good and quite thorough. It is to be regretted that the limited size of the book and extreme abundance of material treated prevents a consideration of those bacteriological findings which demonstrate experimentally the relative value of the different methods. One rather objects to the statement "for additional disinfection desirable if the asistant has recently been in contact with pus or other infectious material . . . . hands may be immersed in potassium permanganate . . . . ." Every person who uses rubber gloves must feel as did Dr. Halsted on introducing them in 1890, and as recently expressed by Sarwey, "dass die Hand niemals, der Handshuh stets keimfrei gemacht werden kann." (Bakteriologische untersuchungen über Handedisinfektion. Sarwey, Tubingen.) The "surgical assistant" with his various ward examinations, laboratory work, and even the exposure in daily life must feel that the most thorough is the only way and that the so-called "surgical habit," which licenses any one connected with operative work to think that cleaning up should be done less thoroughly on account of his not coming into contact with infectious material, is greatly to be deplored.

Were not anæsthetization such a large part of the duties of the surgical assistant, the chapter relating to this subject could well be omitted. It contains many valuable hints but the subject is so important that one who has any of it to do should necessarily be familiar with some more complete work which would make this chapter unnecessary. One is shocked to read, both in text and in illustration, "The index finger is on the facial artery, the thumb is testing the conjunctival reflexes." No one, we are certain, would touch the delicate conjunctiva of a person who is awake to ascertain what his general condition might be, much less while he is anæsthetized and unable to resist such dangerous and uncalled-for insult. Better to cover the eyes with rubber protective and do without any of the eye reflexes, even the much more important ones, than subject the patient to a possible unnecessary traumatic conjunctivitis.

It is truly remarkable that a man in writing a book could think of so many important and minute details which really give the book its chief value. We all know that no operator would be able to write down his exact procedure for an immediate operation, and this makes us feel that the part of the book devoted to the description of the various operations and what is expected of the assistant is chiefly of value in that it points out that an assistant after some experience with certain operations can be expected to be clever enough to outline a theoretical procedure, though he cannot reasonably hope to see it carried out in any subsequent identical operation. The illustrations are uniformly poor. The book contains formulæ for the preparation of surgical material to which, for personal use, it would have been well if a number of blank pages had been left so that methods could be added from time to time as the owner of the copy might see fit. F.

Materia Medica, Pharmacy, and Therapeutics. By S. O. L. POTTER, M. D. (*Philadelphia: P. Blakiston's Son & Co., 1906.*)

The recent revision of the pharmacopeia has brought out new editions of almost all the works on materia medica and therapeutics. The present is the tenth edition of Dr. Potter's work and many additions have been made in it. The book opens with an introduction which contains some general statements regarding the subject and the various constituents of organic drugs. Following this is a section on the classification of medicines which is clear and satisfactory; the methods of administration and dosage are also described. Then follows a large section on materia medica and therapeutics in which the drugs are taken up alphabetically, and after a description of their preparation, the action and therapeutic use are described. Dr. Potter gives a great deal of information and it is interesting to see that he has devoted some attention to the historical side where this is possible. This section as a whole seems exceedingly well done and it is a pleasure to express appreciation of it. In this and the following sections on prescriptions and some methods of pharmaceutical preparations, there are many excellent practical points given.

The third part of the book deals with special therapeutics and it is regarding this that the reviewer feels regret that Dr. Potter has not used his materials in a better way. Diseases and symptoms are given alphabetically and under each one is a long list of remedies that may be used, so that for instance under albuminuria we have "aconite in incipient albuminuria with high body temperature. Lead diminishes the albumen. . . . Cannabis indica is indicated when bloody urine." Surely no one would hold that this is a satisfactory way to set out treatment and it cannot be regarded as either rational or scientific. Many other examples of this might be given, but it would seem that to-day we should be past this nickel-in-the-slot method of teaching therapeutics. Thus under diphtheria we find proper reference to the use of antitoxin but in addition twenty-one drugs mentioned as useful for their internal action, among which we find myrrh, cubeb, and sanguinaria. Does any one to-day consider that these drugs are indicated as internal remedies in diphtheria? There are many excellent recommendations for treatment, but this method of presenting them we believe to be bad and unlikely to tend to rational treatment.

It is surprising in this section on special therapeutics to find five and a half pages devoted to the clinical examination of the urine. This doubtless gives some excellent information, but a work on therapeutics is not the place for it and the space might have been put to better use. In the appendix with a list of contractions and Latin phrases, certain formulæ for hypodermic administration and of some patent medicines, we find six pages given to differential diagnosis. It is difficult to understand what possible excuse there is for putting this in a work on therapeutics.

And when we find the differential diagnosis given between yellow fever and bilious remittent fever one feels like making the humble query as to what is meant by bilious remittent fever? The best text-books of medicine do not mention it.

It is a pleasure to commend the good features of this work, as shown especially in the section on materia medica, but we consider it as much our duty to speak out plainly regarding the section on special therapeutics. It seems too bad that an author to-day would put out such an arrangement. There are of course excellent therapeutic directions given, but it is the irrational and unscientific arrangement which should be so strongly condemned. The work as a whole fails to give anything like a proper discussion of therapeutic measures other than the giving of drugs, which after all is but a small part of the subject of treatment.

Atlas and Epitome of Operative Gynecology. By DR. OSKAR SCHAEFFER, Privatdocent of Obstretrics and Gynecology in the University of Heidelberg. Edited by J. CLARENCE WEBSTER, M. D. (Edin.), F. R. C. P. E., F. R. S. E.; with 42 colored lithographic plates and many text illustrations, some of them in color. (*Philadelphia: W. B. Saunders & Co., 1904.*)

The author of this volume prefaces it by saying that it seems to him appropriate, in an atlas designed to represent technic as it appears to the eye, to classify operations, not according to the parts or organs on which they are performed, but according to the methods of gaining access to them for purposes of operation. He divides his subject, therefore, into "Operations that are performed without the speculum," "Operations requiring for their performance exposure of the vagina," and other divisions of the same character, the whole number being ten. This idea is certainly a new departure in gynecology, but there does not seem to be anything sufficiently advantageous in the results to justify so great a departure from accepted methods.

Apart from the matter of division there does not appear to be anything new or striking in the book, the text of which is written in accordance with principles and methods which are certainly conventional if not antiquated. For example, in discussing perineal operations, the writer adheres to the restricted classification of some time ago, by which lacerations were divided into three classes, namely, those extending to the thicker part of the perineum; those extending to the sphincter; and those extending through the sphincter. In other words, lacerations of the first, second, and third degrees. All the various modifications of these great divisions, upon which modern gynecology has developed such a variety of plastic work, are not alluded to, except for a passing mention of the class of cases in which the integument remains intact though the tissues underneath have given way. The treatment of other subjects is similar to this and the book as a whole, while it is clear in expression and reliable in methods, cannot be regarded as fruitful in new ideas or expedients.

The text, however, as in all books of this kind, is subordinate to the illustrations, with which it is liberally provided. Every variety of operation is depicted with most conscientious attention to detail, but it is impossible not to regret the crudity of the means employed. As a means of designating the position of nerves and blood-vessels, of reproducing the stains employed in the preparation of pathological specimens, and of demonstrating the details of surgical operations, such as the lines of incisions, areas of denudation, and the like, color has its use and purpose; but when the most florid tints and the highest possible glaze are employed solely for the purpose of making the whole illustration as striking as possible to the eye, we can only recall the gaudy picture books of our infancy and wonder at what age the public outgrows its childish tastes. Another matter for regret is the want of accuracy in the proportion of different objects and of judgment in the selection of tints; as for instance, in the representations of surgical procedures where the needles, scissors, and sutures are all of the same shade of gray (which belongs by nature to none of them), and all three objects are of nearly the same size.

The translator has done his work well, and the editorial comments, which show a marked tendency to enlarge the ideas presented, add greatly to the value of the book.

Man and his Poisons. A practical exposition of the causes, symptoms, and treatment of self-poisoning. By ALBERT ABRAMS, M. D. (Heidelberg), F. R. M. S. Illustrated. (*New York: E. B. Treat & Co., 1906.*)

This little volume is a step in the right direction. The whole trend of modern medical knowledge goes to show that man carries within himself the causes of disease, and that a long train of morbid conditions, hitherto misunderstood, are occasioned either by poisons generated within his own system or by the impairment of the processes known as internal secretion, the importance of which to our well-being we are now beginning to estimate. The question of self-poisoning, as the writer truly remarks, "has advanced from a plausible and fascinating theory to a verity."

We took up the book with strong hopes of finding the subject of self-poisoning greatly illuminated by it, but we must confess to considerable disappointment at finding it to consist largely of discursive reviews of the speculations hitherto rife upon the subject when we had expected (not unreasonably, we think,) some practical contribution to our present knowledge. The chapter treating of the influence of mind upon body contains some interesting instances of results obtained by suggestion in persons of susceptible temperament, but we cannot help feeling a greater share of interest in the side of the question which is left untouched, namely, the extent to which such influences can be exercised upon persons whose temperament does not lend itself to them. Dr. Abrams tells a story of a French scientist who gave one hundred hospital patients some water, telling them that it was for purposes of experiment. Shortly afterwards he informed them, in a state of great apparent alarm, that he had given them an emetic by mistake. The result was that four-fifths were taken violently sick. No attention, however, is given to the one-fifth who remained unaffected, and this to our thinking really begs the question, for it leaves the most interesting side of it untouched. We have already abundant evidence that the effect of suggestion upon impressionable persons is very strong, and we are, moreover, fully satisfied that the majority of people are impressionable. It is the minority who are not affected by influences to which their fellows succumb upon whom our interest is centered; and to ascertain how far they also can be affected by the same processes of a stronger degree, or by other processes of a different character is a problem which would well repay investigation.

The whole book is characterized by this same excess of discussion and speculation and while it is, as we have said, a step in the right direction it cannot be said to lead us far along it.

The Four Epochs of a Woman's Life. A study in hygiene. By ANNA M. GALBRAITH, M. D.; with an introductory note by JOHN H. MUSSER, M. D., Professor of Clinical Medicine, University of Pennsylvania. Second edition, revised and enlarged. (*Philadelphia, New York, and London: W. B. Saunders & Co.*)

There is a good deal of sound common sense in this little book, which should recommend it to those who wish to understand the best means of preserving the health and strength of women, either in their own case or in that of others committed to their care. The literary style is clear and simple, and the writer has been

successful in what is often a matter of some difficulty, namely, the use of technical terms without confusion to the uninitiated. She has, however, foreseen the possibility of difficulty in this respect, for she has added a glossary in which the meaning of any word not familiar to the reader is at once at his command.

The chief defect is one common to all books of the class to which it belongs, and that is an unconscious assumption that all claims and obligations should and will yield to the requirements of an ideal hygienic life, as depicted in its pages. From one point of view this is, of course, the proper attitude, for a medical or quasi-medical book is nothing if not didactic; nevertheless, we must believe that a certain amount of adaptation to the difficulties and hindrances with which all women, and especially all self-supporting women, have to contend would be both possible and advisable. The book, as a whole, however, is useful and wholesome; and the fact that it has reached a second edition shows that a niche was ready for it to fill.

Obstetrical and Gynecological Nursing. By EDWARD P. DAVIS, A. M., M. D., Professor of Obstetrics in the Jefferson Medical College, etc. Illustrated. (*Philadelphia, New York, and London: W. B. Saunders & Co.*)

The obstetrical part of this work is full and interesting. All the various peculiarities of obstetrical nursing as compared with nursing of the ordinary character are judiciously pointed out and clearly discussed. Some of the statements strike us as a little behind the times, as, for example, the recommendation of the obstetrical binder, which the best authorities now regard as injurious and a potent factor in the causation of retro-displacements.

The gynecological division of the book occupies much less space than the obstetrical, and the subject is insufficiently treated. It would, however, be impossible to treat both subjects adequately in a volume the size of this one. The importance and scope of gynecological nursing and the many variations of pathological conditions with which it has to deal, cause it to require a much greater space than obstetrical nursing, which in the majority of cases does not deal with any pathological condition at all. It is only a matter of surprise that the two subjects should be treated together at all.

Baby Incubators. A clinical study of the premature infant with especial reference to incubator institutes conducted for show purposes. By JOHN ZAHORSKY, A. B., M. D., Clinical Professor of Pediatrics, Medical Department Washington University, St. Louis. Reprinted from a series of articles in the St. Louis Courier of Medicine, 1905. (*St. Louis: Courier of Medicine Co., 1905.*)

There is a great deal in this little book to render it of unusual interest. It is, in all probability, the first comprehensive account of the work accomplished by the so-called show incubators, and although the detailed descriptions of the various kinds of incubators and their comparative merits are acceptable to only a few, there is much in the nature and results of the work accomplished that is full of general interest.

The writer of the little volume was in charge of the institute where infants were reared in incubators at the St. Louis Exposition of 1904, and he shows plainly that he entered heartily into the good which such an establishment accomplishes, even though it owes its origin to the gratification of the public curiosity. The display of incubators at the Exposition was, of course, purely a business affair, but it was none the less well managed, under the charge of competent physicians and well-trained nurses. Its results show plainly that much good can be accomplished by such means among the poorer classes. In private practice and among well-to-do people, the writer thinks the method is not to be recommended, for, as he points out, the sole function of the incubator is to lessen heat loss, and any methods which serve the purpose for the individual case do all that an incubator can accomplish. The supply of artificial heat, however, is only one, and that not the greatest benefit which public incubators bestow upon premature children. Their value is really much greater in what they effect indirectly than in what they accomplish through the exercise of their own proper function, for, as Dr. Zahorsky shows, the greatest difficulty in the rearing of premature children is not the prevention of heat loss, but the maintenance of a proper nutrition, and this is an end which the public incubators achieve incidentally, but none the less efficiently. The attendance which is essential to their success is really the source of greatest benefit to the infant, for by means of it he obtains the care which the homes of the poorer classes cannot afford.

There can be no doubt from the results shown here that public incubators in our large cities would be a source of great good, not only through the exercise of their proper functions, but on account of the attendant nursing, which of course includes suitable nutrition and all the minor hygienic accessories, such as cleanliness and ventilation. If some of our generous benefactors would find the wherewithal to establish free institutions for the raising of premature infants by means of incubation, there is no doubt that many little lives which are otherwise doomed would be saved.

The book is one which will repay reading. It is full of interesting detail and its attraction is increased by the impression it creates of personal interest on the part of the writer. He admits frankly that the elimination of what he calls "hospital atmosphere" is an important factor in the success of the work, and it is the absence of a certain coldness and indifference that is often associated with accounts of institutional work together with the presence of an indefinable sensation of heartiness and kindly feeling which render the book so attractive.

The Signs of Internal Disease. With a brief consideration of the principal symptoms thereof. By PEARCE KINTZING, B. Sc., M. D., Professor of Physical Diagnosis and Diseases of the Heart, Maryland Medical College. Illustrated. (*Chicago: Cleveland Press, 1906.*)

The book is divided broadly into diseases of the chest and of the abdomen, together with a general outline of the examination of the urine and fæces.

In the chapters devoted to the diseases of the chest the various methods of examination are discussed. A brief review follows of the more important anatomical points from a clinical standpoint, elucidated by many diagrams and plates, not all original, which should clear away any uncertainties in the student mind. The various physical signs are then considered and their significance noted. Finally the more common signs of such diseases of the lungs, as bronchitis, pleurisy, pneumonia, and tuberculosis, are passed hastily in review. This same general scheme is carried out in regard to the heart and the various abdominal conditions. There is also a short chapter on the Roentgen ray in diagnosis.

In order to cover so much ground in 355 pages it has been necessary to be brief and to treat many subjects in a more or less superficial manner. Indeed in one or two instances there have been important omissions, as a consideration of empyema and fibroid phthisis in the diseases of the lungs.

In order to be concise, many of the statements appear rather dogmatic and in some of the diseases, notably pericarditis, exceptions are taken to them. On the whole, however, the writer has given a brief outline of internal medicine, which should prove of value to the beginner in this subject.

The Diseases of Infancy and Childhood. By HENRY KOPLIK, M. D. Second edition. (*New York: Lea Brothers & Co., 1906.*)

A second edition of this text-book on The Diseases of Infancy and Childhood by Dr. Koplik has recently appeared. The writer's large clinical experience and thorough laboratory training render this work peculiarly valuable. The arrangement of chapters in the first edition has been somewhat altered in this one and considerable new material has been added.

A fairly complete introductory chapter on the anatomy in infancy and childhood would improve the book for the general reader, who could then easily turn to facts concerning the structure and relationship of the important organs at several important age periods before taking up the systematic study of the diseased conditions. A very good account of the urine in infancy appears in the introductory chapter, page 31, but little is said of the character of the feces and the description of the blood in normal children is reserved until Chapter IX.

In the directions for history-taking, more emphasis could properly be laid upon the character of the diet before the onset of the illness; and in the methods of procedure in the physical examination of infants, the desirability of proceeding with auscultation of the chest after inspection and before palpation and percussion is not impressed upon the reader, and there are some situations in which the phonendescope is of great service.

Dr. Koplik's description of the management and hygiene of the normal infant and of the various methods of therapy is concise and accurate. Fortunately gavage or forced alimentation is rarely necessary, but in our experience, the introduction of food through a nasal catheter is often more satisfactory than by means of a stomach tube.

Section II of the book is devoted to the much-discussed question of infant feeding. The section has been completely recast and much new matter added. The chemistry of human milk and cow's milk is carefully presented but with sufficient fulness to enable the student to understand the nature of the infant's natural food and the important differences which exist in the milk of animals.

The writer lays more stress, very properly, on the necessity of clean milk and less on the minute modification of the ingredients except for a few cases. The value of the so-called American System of Milk Modification is not that there is any special advantage to be gained in changing the baby's proteid from 1% to 1.1% or the fat from 2% to 2.2%, but that largely through the introduction of the percentage feeding the physician has it in his power to change the particular ingredient of the diet that seems to be at fault without altering the remainder of the formula.

Dr. Koplik details his method of milk modification, using as a rule 12% top milk, upper 9 oz., of a quart of milk allowed to stand several hours. It is probable that the ratio of fat and proteid is nearer 4:1 than 3:1 as calculated by Dr. Koplik, and that he has used the method so successfully only illustrates that minute variations in percentages are not as important as pure milk. Probably in another edition less stress will be laid on treating milk either by Pasteurizing or sterilizing, even in hot weather, and more on the bacterial count of the milk on delivery and on its proper refrigeration. At present some form of treating seems necessary among the poorer classes. The discussion of the proprietary foods is fair. Their use in exceptional cases and with full knowledge of their composition is permissible.

Koplik's experience with plain barley water versus dextrinized gruel for very young infants is difficult to explain. It is well to have the admirable method of Keller for making cereal gruels, described in an American text-book, page 149.

All the ills the newly-born baby can be heir to are discussed in the following section. Fortunately many of these are exceedingly rare and others are more often seen by the Obstetrician than by the Pediatrician. The care necessary for the successful raising of premature babies is well described. Possibly in this connection a little too much emphasis is laid on the importance of the incubator, which even in its simplest form requires constant and skilled attention, and moreover brilliant results can often be obtained at room temperature and with properly applied external heat.

The chief addition which Dr. Koplik has made to the section on infectious diseases is in the chapter on meningitis which has been admirably rewritten and the writer's unusual large experience during the recent epidemic in New York has been freely drawn upon. The bedside distinctions between the epidemic and the tuberculous forms of the disease are clearly stated. Lumbar puncture is advised in all cases of meningitis. A precise description of the best method of carrying out the procedure in children is given and there is a sufficiently full account for clinical purposes of the cytology of the spinal fluid. Considerable new material has been added to the account of typhoid fever in infancy and childhood and the probability that the disease is more frequent during early life than was formerly supposed is properly suggested. The disinfection of the urine as well as the stools should be specifically insisted upon. Various psychoses should be included among the complications and sequelæ. The discussion of the other infectious diseases has been little altered in this edition and few of the more recent references to the literature have been added.

The serum treatment of scarlet fever which seems helpful in the hands of Escherich and his assistants deserves mention, as does the Dock method of vaccination.

The section on Diseases of the Digestive System has been rearranged; no notable additions have been made. Added experience has shown the prognosis in surgical interference in cases of pyloric stenosis to be better than Dr. Koplik leads one to hope, and the cause of the stricture is now known to be a hypertrophy of the circular muscular layer.

In the discussion of the etiology of Summer Diarrhœas of infancy it is to be regretted that Dr. Koplik has apparently given no credence to the recent investigations conducted by many workers under the direction of the Rockefeller Institute for Medical Research. These have shown conclusively that the dysentery bacillus is associated with a considerable number of even the milder forms of epidemic summer diarrhœa as well as with many cases of ulcerative ileocolitis and is not confined to those forms of diarrhœa resembling adult bacillary dysentery. The term dysentery of infants if etiologically employed must include intestinal affections of varied nature and intensity.

The excellent research of Wentworth should be mentioned in any recent description of infantile atrophy.

There are many useful suggestions in the chapter on constipation in infants and children.

Congenital dilatation of the colon, acute intestinal obstruction, and appendicitis are all fully considered (there are no references for the student appended later than 1901). In the discussion of the diseases of the throat, bronchi, and lungs and heart the extensive bedside experience of the writer is used to good purpose.

Following the chapter on rickets, in which the important contributions of Kassowitz and his students are given full credit, there is a brief discussion of the more unusual diseases of the skeleton, Chondrody's trophia fœtalis and osteogenesis imperfecta.

As Dr. Koplik says, diabetic mellitus is of rare occurrence in infancy and childhood, but hardly sufficient attention is called to the very grave prognosis from this disease in early life.

The blood diseases are fully treated. The author accepts the pseudoleukemia anæmia of Von Jaksch as a clinical entity, a posi-

tion which is denied by some of the latest writers. Concerning the relationship between the lymphatic apparatus and the number and nature of the lymphocytes few positive statements of fact can be made at present.

The section on diseases of the ear is timely. It would have been well to follow it with a brief consideration of the diseases of the external eye, as simple affections of the lids and conjunctiva must often be treated by the pediatrician and the subject is omitted in most of the American text-books.

In the discussion of the diseases of the kidney Dr. Koplik has adopted the somewhat disputed classification of nephritis advanced by Delafield. In the treatment of nephritis the recent suggestions of Dr. Morse deserve mention, by which the proteid metabolism is decreased and yet the calorific value of the diet maintained by increasing the proportion of cream in the milk mixtures. One misses also any allusion to the regional anatomy of the kidney.

The discussion of the infections of the urethra, bladder, and external genitalia is excellent.

The affections of the nervous system are considered rather briefly in Section XIII. In the treatment of convulsions Dr. Koplik places the patient's head low to relieve the cerebral anæmia which he asserts is present through the attack. It has usually been taught that the brain is in a state of venous congestion during the eclamptic seizure, in which case this postural treatment would be contraindicated.

The outlook in congenital internal hydrocephalus, absolutely grave under the older methods, has been made somewhat better than Dr. Koplik indicates, by surgical interference and the establishment of permanent drainage from the spinal canal to the cavity.

The first section of Book IX is devoted to the more important diseases of the skin in infancy and childhood.

The book is carefully edited and well printed. It is especially valuable among other American text-books on pediatrics on account of the distinction of the author and because it perhaps more than any text-book on the subject in this country reflects the influence of the fundamental contributions that have been made to our knowledge in this field from the German laboratories and clinics.

J. H. M. K. Jr.

Burdett's Hospital and Charities, 1906. Being the Year-Book of Philanthropy and the Hospital Annual, containing a review of the position and requirements, and chapters on the Management, Revenue, and Cost of the Charities. An exhaustive record of Hospital Work for the year. It will also be found to be the most useful and reliable guide to British, American, and Colonial Hospitals and Asylums, Medical Schools and Colleges, Nursing and Convalescent Institutions, Consumption Sanatoria, Religious and Benevolent Institutions and Dispensaries. By Sir Henry Burdett, K. C. B. (*London: The Scientific Press Limited, 28 and 29 Southampton Street, Strand, W. C.*)

The Annual for 1906 contains its usual valuable and instructive figures. The book, in fact, is interesting to an American from cover to cover as indicating the condition of hospital administration abroad as well as in America. The advertisements even convey much food for reflection; as, for example, where Guy's Hospital makes an appeal for £43,000 to pay debts and an annual fund of £25,000 for running expenses. There is a degree of comfort in reading these appeals, because hospital men in America have been led to think that they were extravagant and foolhardy in projecting improvements beyond the income of the hospital. We know of no hosiptal, however, in this country which has upwards of $200,000 of debt and which requires an annual subscription of $125,000 for running expenses. It is interesting to see that nowhere else can we get as reliable statistics concerning the hospitals in America as are contained in this Annual. The labor incident to the analysis of the figures presented in this volume is colossal, and a master-mind is required to make the proper deductions from them.

A chapter from Dr. Goldwater, of the Mt. Sinai Hospital in New York, on American hospitals is of interest, however reluctant we may be to accept his conclusions. We would commend the chapter on the "League of Mercy" to charitable workers in America. The book should be in the hands of every hospital worker and might be consulted with advantage by every board of trustees.

The World's Anatomists. By G. W. H. Kemper, M. D. (*Philadelphia: P. Blakiston's Son & Co., 1905.*)

This little book of seventy-nine pages is a compilation of a series of papers originally published in the Medical Book News during 1904. A number of names have been added so that in the present form there are treated two hundred and twenty-nine names. There is a brief description of the life of each anatomist, mention of his most important writings, and of his principal anatomical discoveries, making a very convenient reference book to those who wish to refresh or add to their knowledge of medical history. The criticism might be made that the notes are too brief, but perhaps were they longer they would be referred to less often. The book is a most convenient and valuable one and every physician and student should have one on his work table.

W. R. D.

Chirurgie Oto-Rhino-Laryngologique. Par George Laurens. (*Paris: G. Steinheil, Editeur.*)

This monumental work represents, in our opinion, the best exposition of the surgery of the affections of the nose, throat, and ear in any language. As the title indicates, this work deals solely with the surgical treatment of diseases of these organs.

The operations on the various parts are preceded by a short but thorough anatomical description. The treatment before, during, and after the operation is given with minute detail. The various complications that may arise are carefully considered. The various operations devised for a particular disease are described in detail, their rationale as well as their advantages and disadvantages.

This work of one thousand pages indicates in a way the tremendous progress that has been made in these special branches. One cannot understand how any surgeon untrained in special technique, can attempt this class of surgery.

S. R.

Genito-Urinary Surgery and Venereal Diseases. By J. William White, M. D., and Edward Martin, M. D. Sixth Edition. (*Philadelphia and London: J. B. Lippincott Company, 1905.*)

The general value of this work and its high standing among English text-books on genito-urinary diseases are well recognized by the medical profession. It is desirable now merely to note the innovations and additions in this recent edition. The arrangement of presentation is improved. The general features of disorders of the urinary tract are taken up in a separate chapter and not appended to the article on the bladder as heretofore. Urethritis is considered broadly, its etiology systematically stated, and gonorrhea is made a sub-head, yet of course is given the minute attention its etiological importance demands. In the section on gonorrhea we note the condensation or elimination of many paragraphs, a refining process which might advantageously be pushed further throughout the book. Cystoscopy and ureteral catheterization are considered at greater length. However, the

value of cystoscopy in prostatic hypertrophy is not brought out—scarcely mentioned. In the section on enlarged prostate is given a good brief résumé of the operative treatment of benign hypertrophy, although the authors still insist that castration is indicated in some cases. The chapters on syphilis are placed at the end of the book, and a newly arranged index completes the volume.

In general, the subject matter has been brought up to date, and with the many improvements in arrangement, this edition promises to be of great value to both the student and practitioner.

Die Placentation Beim Menschen. Von J. CLARENCE WEBSTER. Translation into German by DR. GUSTAV KOLISCHER. (*Berlin: Oscar Coblentz.*)

The present monograph is a translation of the volume published in English in 1901, and already made the subject of review in the BULLETIN. Profesor Webster is to be congratulated on the demand to render his work more accessible to German readers.

Two notable changes from the former edition are to be found: First, there is a most striking improvement in the illustrations. These remain the same in subject-matter with the addition of two or three new cuts, but the reproduction is invariably larger. The result is a much clearer and more detailed picture than formerly. Again, the more diagrammatic drawings now given do away with the indistinctness which diminished so much the value of the earlier ones.

The second change lies in extending the text so as to include a chapter on placenta prævia. A review of the various theories regarding the causation of the condition is given. The author regards the formation of the placenta from the decidua reflexa as the more common factor in the etiology of the condition. However, these cases most frequently eventuate in early abortion. Those instances in which pregnancy advances to term are more likely explained by an originally low implantation of the ovum in the uterine cavity.

The work of translation has been very well done.

Scientific Memoirs. By OFFICERS OF THE MEDICAL AND SANITARY DEPARTMENTS OF THE GOVERNMENT OF INDIA. Serum-Therapy of Plague in India. Reports by Mr. W. M. HAFFKINE, C. I. E., and VARIOUS OFFICERS OF THE PLAGUE RESEARCH LABORATORY, BOMBAY. Edited with an introduction by LIEUT.-COL. W. B. BANNERMAN, M. D., B. Sc., F. R. S. E., I. M. S., Calcutta. (New Series) No. 20. *Office of the Superintendent of Government Printing, India, 1905.*

The conclusions reached by careful observers of the effect of different anti-plague sera are that the remedy is far less effective than the serum used in the treatment of diphtheria, that to be most effective, injections of any sera are those which pass directly into the blood stream and overwhelm the bacilli at once by mass action, as it is termed, and finally that the use of sera does not affect the case-mortality in the slightest degree. It is believed, however, that sera do prolong life. They also lower the temperature, lessen the pulse and respiration rate, diminish delirium and restlessness, cause a disappearance of buboes and lessen pain in them. This gives encouragement to a further trial of serum-therapy.

The Physical Examination of Infants and Young Children. By THEBON WENDELL KILMER, M. D. (*Philadelphia: F. A. Davis Co., 1906.*)

In the preface the author states that nearly all the text-books on pediatrics are deficient in their treatment of the subject of the physical examination of infants. "We must forget and unlearn all the things we ever knew about adults when we come to the examination of children." He also states "that he makes no pretense as to outlining physical diagnosis nor pathological conditions of any kind whatsoever; his only aim is to instruct the student and physician how to examine a baby."

In spite of the author's statement in the preface the book contains little else than a rather crude review of the technique of physical examination, including history-taking, inspection, palpation, auscultation, percussion and the examination of the special organs, excretions, etc. The book contains 84 pages and 59 illustrations. The only illustrations which might be of value to a student are four indicating the outlines of organs at the ages of 11 months and 5 years, and two indicating the technique of lumbar puncture.

Nursing: Its Principles and Practice. For hospital and private use. By ISABEL HAMPTON ROBB, late Superintendent of Nurses and Principal of the Training School for Nurses, Johns Hopkins Hospital; late Superintendent of Nurses, Illinois Training School for Nurses. Third edition, revised and enlarged. Illustrated. (*Cleveland: E. C. Koeckert, Publisher, 715 Rose Building, 1906.*)

Notices of previous editions of this book have appeared in the BULLETIN. The important changes which have been made in the third edition indicate in a striking manner how much the training of nurses has developed during the past twelve years. The book has been practically rewritten and brought up to date. It is unquestionably the best manual for teaching the principles and practice of nursing which we possess. The specific directions given for nursing the sick, the hygiene of the sick room, sterilization and disinfection, the care of patients, methods of taking temperature, giving baths, making external applications, giving medicines, observing and recording symptoms, feeding the sick, and the like, are clear, explicit, and well stated. The special chapters also on the operating room, gynecological operations, the administration of anesthetics, and the nursing and care of infectious diseases, are to be especially commended. All things considered, the book has profited greatly by its careful revision and can be commended for use in all training schools.

A Laboratory Manual of Physiological Chemistry.. By E. W. LOCKWOOD, M. D., Ph. D. Second edition. (*Philadelphia: F. A. Davis Company, 1906.*)

The first edition of this elementary manual was reviewed in this journal in February, 1900. The work has been somewhat enlarged, the number of experiments described being increased from 340 to 425. The author has failed to correct some obvious errors which occurred in the first edition. Thus on page 142 he still maintains that the reaction of milk "may be amphoteric to litmus; that is, it turns red paper blue and blue paper red." However, the manual is fairly satisfactory and deserves to be recommended.

Nasal Sinus Surgery with Operations on Nose and Throat. By BEAMAN DOUGLAS, M. D. (*Philadelphia: F. A. Davis Co., 1906.*)

This small excellent work briefly summarizes the operative treatment of the diseases of the nose and throat. We recommend it to those interested in the surgery of these affections. Well illustrated anatomical descriptions are given of the affected parts, previous to the description of the operations.

The book is nicely printed and is an agreeable addition to the various works in this field. S. R.

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